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# The Pocket Debate Book

*First Edition*

**Dean Tersigni**

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***First Edition*** [2nd DRAFT]

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***By: Dean Tersigni***

# Introduction

Any person who feels strongly about an issue will inevitably find themself in a debate. During a debate people are expected to prove their point thoroughly by presenting facts and citing references in a coherent manner. While people have time to prepare for professional debates, casual debates often spring up out of the blue. I, like you, have often tried to make points on subjects that I couldn't remember fully, or needed sources that I didn't have with me. Instead of carrying hundreds of books with you or clumsily searching through thousands of Web pages without citations, *The Pocket Debate Book* gives you detailed responses to common claims on popular issues.

You no longer need to memorize tables of data or the various names of logical fallacies. All of the citations, book titles, authors, and arguments you'll need can be found here in a book small enough to carry around with you where ever you go. From now on, you'll always have the references you need to meet your points in a casual debate.

The ability to debate coherently is a difficult skill to master. *The Pocket Debate Book* assumes that you already have a basic understanding of debate and won't teach you the basics. You will find many tips on debating, but the main purpose of this book is to give you the ammunition to properly address important topics of debate in an intelligent manner.

This book is broken up into sections and each section addresses a different topic of debate. The sections begin with a brief explanation of the topic and then proceed to give the common claims regarding the topic and counter arguments to those claims. Remember that the burden of proof lies on the claimant.

It's important not to forget that in a debate you're not just arguing a point, but you're also arguing against person. Logic and reason alone are not going to make someone change their minds overnight. People who have held a belief for their entire lives are not wont to simply give them up, regardless of how foolish they sound. Convincing someone of a more reasonable or logical viewpoint is a delicate task and it may be a long time before any progress is made—if any at all. If you're not willing to invest that time, you may be better off not even bothering to debate them to begin with. Going around trying to prove people wrong just to make yourself feel superior is cruel and unappealing.

Also, remember that there was a time when you held beliefs that you now believe to be foolish. Try to remember why these past beliefs were important to you and how it came to be that you finally realized that they were not true. Doing this will be very helpful in helping you debate without losing all your friends in the process.

~ Dean Tersigni

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# 1.0 Science

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At its most basic level, science is is a way of making the unknown known. Science makes observations of the natural world and uses reasoning to construct models to better understand why and how observed phenomena takes place.

Science is concerned with everything that affects the natural world in any way, shape, or form; from people to ideas, from the weather to the stars.

Anything that is empirical can be studied scientifically. Something is empirical if it can be measured or tested. “My dog is faster than your dog,” is an empirical statement because it can be tested by racing the dogs. However, “I love my dog more than you love your dog,” is not empirical because there is no method to accurately measure love.

Science is objective not subjective. Things that are measured in the same

way by everyone are objective while things that people view differently are subjective. For example, saying "I'm tall," is subjective, because everyone has a different idea of what "tall" is. However, saying, "I'm six feet tall," is objective, because everyone views six feet as the same amount.

Science is concerned about discovering truths and making facts based on those truths. A truth is always true, regardless of whether it has been discovered and regardless how many people disagree. For example, it is true that the planet Earth rotates around the sun. This was true thousands of years ago when nobody knew it to be true, it was true when the church of England tried to prevent Copernicus and Galileo from demonstrating it, and it is still true to this day even though some people still deny it. It became a fact when astronomers could demonstrate it's truth through scientific means.

For hundreds of years now, science has proven itself to be the most effective way to gather, interpret, and utilize information so that all humans can benefit from the truth. Science has allowed us to usher ourselves from of the darks ages of self-delusion into a world of understanding beyond the imaginations of our ancestors. Yet, many people don't understand science very well. A lack of scientific understanding dooms us to repeat the same mistakes as our ancestors. Others even turn their back on science, all the while enjoying the very comforts science provides, completely ignorant to its benefit. Yet, science is a beacon of light in a dark world. All of the most useful and life-saving advances of human achievement are made possible by scientists and their methods.

## *Claims*

**Claim:** Science is a religion.
**Counter:** First you must define what a religion is. If you use an extremely broad definition like, "a religion is a set of ideas held by a group of people," then nearly everything can be considered a religion from democracy to table manners. This is not the case however. All the world's popular religions have one thing in common. They all deal with spirituality through supernatural means and involve faith, belief, and a form of prayer/meditation. Science, however, is only concerned with empirical phenomena of the natural world. It does not concern itself with non-empirical phenomena like faith, the occult, or the supernatural. Science can be used to measure the evidence from the claims regarding those topics, but it can't, for example, measure whether or not a non-corporeal god exists. Science is a system of thinking and procuring knowledge, not a religion.

**Claim:** Science can't be a foundation of society because science is always changing.

**Counter:**

- Anything you can base a society on, including religion, changes over time. For example, a century ago most world religions condoned practices such as slavery, polygamy, and misogyny—yet today most have changed and now condemn these practices.
- Religions don't have answers to modern problems. None of the older religions address how to handle traffic violations, building codes for sky-scrapers, or nuclear energy.
- Religions don't even address topics of morality with much detail. For example, none of the older religions directly address abortion. The followers of these religions must extrapolate from their scriptures in order to find what their founders probably wanted, but none of them specifically say whether abortion is right or wrong.
- Science doesn't change as much as you'd think. Many aspects of science show no signs of changing, like the scientific method, the laws of motion, and thermodynamics. For the most part, science merely revises existing theories. For example: Johannes Kepler created his theory of planetary motion around 1605. These laws were used by Isaac Newton's more encompassing theories of motion and gravity in 1687. Newton's theories were later revised by Albert Einstein's theories of relativity in 1905. His theories have been added to over the years by other physicists and a new theory that explains the observed information even more accurately will probably come along in the future. However, even after all these revisions you can still use Kepler's theory from 1605 to measure planetary motion with extreme accuracy. Just because science gets revised, doesn't mean that it wasn't accurate to begin with.

**Claim:** The definition of "science" should be altered to allow supernatural causes.
**Counter:** If you alter the definition of science to allow supernatural causes you would be able to answer every scientific question with "magic pixies did it" and there would be no way to prove otherwise. That would be taking a huge step back to the time prior to the Scientific Revolution and giving the archaic practices of astrology, mysticism, and alchemy equal importance as cosmology, physics, and chemistry. Supernatural causes cripple learning because there are literally an infinite number of possibilities. If you allow any of them, you must allow all of them, since each is just as unlikely as the next. Unless we want to revert to the Dark Ages, supernatural causes must be kept out of science.

**Claim:** Science isn't that important, real advancements in life come from technology.
**Counter:** Technology is the application of science, and cannot exist without science. Technology uses equations, materials, and ideas discovered by science. If you remove science from technology you are removing chemistry, physics, and mathematics. How much do you think engineers can accomplish if you tell them they can't use chemistry, physics, or mathematics?

**Claim:** Your statements don't count because you're not qualified to make them.
**Counter:** Although qualifications are certainly important, they aren't mandatory for making logical observations. For example, I'm not a mathematician, but I can still correctly state that 2 + 2 = 4. Also, I am not a doctor, but I still know that bacteria, viruses, fungus, and parasites cause diseases.

# 1.1 - Process

While the purpose of science is to understand the natural world using natural means, the process of science comes from applying the scientific method to the natural world. The scientific method and testing is explained in more detail in the following sections.

# 1.1.1 - Scientific Method

The scientific method is the basis of all science. It is an encompassing method of making observations, designing and performing tests, gathering data, and analyzing the results. Any form of observation and testing that measures empirical data can fit into the scientific method.

The scientific method can be broken into four main steps:

1. Make an observation
2. Create a hypothesis to explain the observation
3. Create a way to test your hypothesis
4. If the hypothesis fails the test, make a new hypothesis. If it succeeds, test it over and over again.

## *Claims*

**Claim:** The scientific method is a flawed system of gathering information.
**Counter:** The scientific method is responsible for the Scientific Revolution and is the cornerstone for all scientific achievement which has been immeasurably beneficial to all life. No other system has been as effective.

**Claim:** Many things don't need to apply to the scientific method because they are common sense.

**Counters:** The result of common sense is often wrong:

- Using common sense, the Earth appears flat because:
  - You cannot see any curvature of the Earth, even from mountain peaks. Only until you get to space can you physically see a round earth.
  - The planet's landscape prevents primitive attempts of circumnavigation which would prove the Earth's shape.
  - When out in the ocean the horizon appears flat in all directions.
  - Without a modern understanding of gravity, it wouldn't make sense that people on all sides of the Earth would be pulled to the center.
  - Only through science, using detailed observation and interpreting evidence, can you realize that the Earth is not flat.
- Using common sense, the Earth appears to be the center of the universe because:
  - You cannot feel the Earth spinning or rotating around the sun.
  - From Earth, the sun, moon, planets, and stars all appear to be moving around us, not the other way around.
  - Only through detailed observation and interpreting evidence can you realize that the Earth rotates around the Sun.

# 1.1.1.1 - Observations

The scientific method starts with an observation. Since humans are constantly making observations, this part is easy. At some point someone is going to observe something that makes them wonder. It may be something that they've never seen before, or it may be something that they've seen every day, but now are curious about.

Although many people wonder about their observations, few people actually consider the cause of what they observe. Of those who do, they make a hypothesis, which the next section discusses.

## *Claims*

**Claim:** You cannot trust your senses, and therefore you cannot trust the results of any scientific observation.

**Counters:**

- Our senses are the only way we receive information, and therefore, the only way that we can discern reality. With our brains we can interpret the information our senses receive into reality.
- With other people, all using their senses and brains together, we can reach a consensus on reality.
- If we can't trust our senses, then I can't even trust that you're there making this argument because my sense are how I know that you're

there, nor can I trust what I hear you say. In fact, I couldn't even trust the fact that I can't trust my senses!

**Claim:** It's impossible to prove that we're not a brain in a vat that is being fed impulses by a super computer, and therefore all of our observations can not be trusted.
**Counter:** This old philosophical thought experiment is usually used to talk about belief systems, but it is valid for observation in general. Whether we are a brain in a vat is irrelevant since objective observations are consistent for all people. It doesn't matter if they are artificial or genuine, they yield the same result.

# 1.1.1.2 - Hypotheses

Once an observation is made, some people are inclined to simply accept it at face value and not wonder about it. However, curious people will wonder why or how the observed phenomena occurred. Even more inquisitive people will try to come up with an idea to explain the observation. An idea to explain an observation is called a hypothesis. A good hypothesis will explain everything that was observed and be testable. Testing is very important to science and is explained in the next section.

# 1.1.2 - Testing

Probably the most seemingly convoluted aspect of science is the great amount of testing that goes into it. Tests are used to convert abstract hypotheses into useful theories and offer valid proof. In science, testing is strictly controlled. It needs to be, otherwise we would never know if the outcome is genuine, a misinterpretation, or a mistake.

In order for a scientific test to be effective, it must be falsifiable; that is, the test should have a clear distinction between success and failure.

The purpose of a test is to offer valid evidence. Stories and anecdotes cannot do that because when people tell stories they often forget certain parts, exaggerate, or confabulate the story with another memory they have. This is why scientists don't allow anecdotal evidence and instead rely on tests for their evidence.

In science, a single test doesn't yield overwhelming proof. Tests must be conducted over and over again, in many different forms and variations, before they can be considered proof. Even then, a test can still not definitively prove or disprove anything 100%. While logic can be used to prove certain concepts, the physical matters that science deals with can, at most, only offer a very high or low level of certainty. For example, a single test cannot prove that aspirin is

truly effective at relieving pain, but now that we've had billions and billions of successful test result, no reasonable person would claim that it is not effective.

# 1.1.2.1 - Variables

When setting up a good test, the designer's objective is to eliminate all but one variable. Variables can influence the outcome of a test, and by eliminating as many as possible, the results of the test will be easier to interpret.

Of course, it's impossible to remove all other variables, so additional measures are used to make any hidden variables come to light. One way to do this is to test in large groups. That way, all the variables of the testing procedure will become more apparent.

# 1.1.2.2 - Measurements

When performing a scientific test, it is very important to accurately measure everything. This is because people have a tendency to misjudge values, especially when they're expecting specific outcomes.

For example, what if someone makes a claim that using a special gasoline additive gets better gas mileage? A simple driving test wouldn't suffice because there are many variables that need to be measured like how much gas was in the gas tank, how much of the additive was used, what speed was driven, how much acceleration was used, for far was the vehicle driven, what were the weather conditions, how many hills and valleys were driven, at what altitude did the drive take place, and so on. All of these factors must be taken into account, many may not seem likely at first glance.

The most important aspect of keeping proper measurements is so that other people will be able to replicate your test very accurately when they try to duplicate your results.

# 1.1.2.3 - Controls

Controls are used in order to make sure what is being tested (the variable) is the only factor involved. Without controls you can't know for sure if there aren't other factors that are influencing the outcome of your test.

Suppose you have a person who is ill. You give them some medicine and three days later they feel better. You may conclude that the medicine healed the person, but how can you be sure that the medicine worked? Who's to say that the person wouldn't have felt better after three days without any medicine? Although you can never be 100% sure, a test will always be more effective

when you add controls. A control is a part of the test that is not affected by the variable. For example, let's say you took ten people with the same illness and gave five of them medicine and didn't give the other five anything. If the five who received medicine started feeling better, and the five who didn't get anything still feel sick, then it seems more likely that the medicine works. However, if all ten people feel better, or none of them feel better, or if half of each group feels better, then you know that the medicine probably doesn't work that well.

Control groups are very important because most observable phenomena changes over time regardless of whether anything is done to affect it. Without a control you won't know if your variable caused the change or if the change was caused by other outside influences. Here are some examples of how control groups are important:

1. A person with cancer eats garlic and honey for a month and afterward the cancer seems to be in remission. Without a control you won't know if the remission is part of the natural cycle of cancer or if the remedy really works.
2. A woman sprays her car tires with a product that claims to make them last five years. However, her tires may last five years regardless of whether she uses the product. Without a control group she can't be certain.
3. A man sprays his plants with a special fertilizer that claims to double their growth. However, without a control group, he can't tell the difference in growth because he doesn't know how large his plants would grow without the fertilizer.

It is also important that controls be distributed randomly in order to prevent any clustering that may occur with the test subjects. For example, you don't want to take a test of 50 people and give the first 25 the test, and use the second 25 as a control. The first 25 could have an anxiety disorder that makes them chronically early for everything, the last 25 may have arthritis which makes them take longer to arrive, either of these conditions may affect the outcome of the test. When you randomly distribute the control subjects there is less of a chance that you're inadvertently altering the test result.

# 1.1.2.3.1 – Placebo Effect

The placebo effect is a measurable change that occurs when a subject believes that they're receiving treatment even though they're not receiving actual treatment. This effect can be simulated by treating the subject with an inert substance (called a placebo) and measuring the psychologically perceived improvement.

Placebos have very little physical effect. That is, a placebo won't knit broken bones, cure cancer, or kill bacteria. However, placebos do have a measurable psychological effect that can be seen in reduction of perceived pain, drowsiness, etc.

The measured effect from receiving a treatment which has no effect versus no treatment at all is different. That is why scientists must control for placebos by giving placebo treatment to a test group in order to measure how much change can be expected in the group simply from the perception of receiving treatment.

There is also a measurable placebo effect when subjects are informed that they are taking part in a placebo test compared to when they're given placebos without being informed.

### *Claims*

**Claim:** The placebo effect doesn't exist.
**Counters:** Several studies have been made which show the placebo effect to be a legitimate phenomena.

- A 2008 test published in the *Journal of the American Medical Association* gave 82 people electric shocks. Then, they gave them pain killers and readministered the shocks. 85% of the people indicated a significant amount of pain relief from the pills, but the pills were placebos.
- In 2007, the *Proceedings of the National Academy of Sciences* published studies from Columbia and Michigan University which showed the brains of volunteers under PET scans. They were told that they were taking pain medication, but they were actually receiving placebos. However, because they believed they were receiving pain killers, their brains began spontaneously releasing opioids. (Donaldson James 2007)
- In 1996 Herbert Benson of Harvard Medical School and Richard Friedman of State University of New York published a paper stating that the placebo effect yields beneficial clinical results in 60–90% of diseases, including angina pectoris, bronchial asthma, herpes simplex, and duodenal ulcers.

# 1.1.2.3.2 - Double-Blind

A double-blind procedure is crucial in order to help eliminate selective thinking and the placebo effect. Scientists and doctors fall prey to wanting a test to come out a specific way and often inadvertently adjust their findings accordingly. Also, scientists and doctors may act differently around patients who they know are receiving real medicine versus placebos.

A double-blind test is specifically designed so that neither the operator nor the subject knows who is receiving the variable. A third party who never consorts with the operators or subjects (until after the test is completed) is in charge of who receives the variable. Every test should be conducted double-blind if possible.

For example, if drug company wanted to know if their new painkiller was more effective than a placebo, they could perform a double-blind test of their drug. They could do this by getting 100 patients with similar causes of pain and having their names on a list. Then, they could randomly assign 50 names on the list the painkiller while the remaining 50 will receive a placebo. They would then take a bottle for each subject and fill each with the painkiller or the placebo according to how they were assigned. The placebo should look identical to the real drug. Doctors, who don't know which pills are real and which ones are sugar pills, will hand out the bottles to each patient, and monitor their pain levels for the next couple weeks. At the end of the test, both the patients and the doctors are ignorant to who received the placebo. With this unbiased double-blind data, the drug company will be able to determine if their painkiller was more effective than simply telling someone they are on a painkiller.

# 1.1.3 - Peer Review

Peer review means that all aspects of a scientific test are reviewed by a scientist's peers in order to check for errors or inconsistencies. By allowing many other scientists to review the procedures, methods, and results of the test there is a greater chance that any mistakes will be noticed. Because of this, the more peers that review a test and agree with it, the more merit that test has.

All tests should be peer reviewed and repeated by as many colleagues as possible to ensure that all possible explanations and flaws are brought to light and corrected.

# 1.2 - Theories

A theory is the most important aspect of science. Theories are made from the few hypotheses that make it through the rigors of testing, retesting, and peer review. They explain, in detail, observed phenomena, and more importantly, offer testable falsifiable predictions.

Theories are composed of several facts, laws, and hypotheses all combined together in a coherent form. Facts and laws are sometimes the foundation for theories and new facts and laws are often discovered when theories are put to the test.

### *Claims*

**Claim:** A theory is just a guess.
**Counter:** Although the layman uses the word "theory" to mean "guess", in a scientific context, a theory is a well-tested and established statement that explains observed phenomena. Theories are more useful to science than ideas, facts, or laws.

**Claim:** A theory is not a fact.
**Counter:** Theories are composed of facts. Facts are very useful, but they do not explain observable phenomena to the scope of a theory. Theories contain facts that are assembled in coherent forms. For example, it is a fact that living organisms are made up of cells, but that statement isn't very useful to biologists by itself. However, cell theory uses that fact, and many others, to explain how and why cells divide, function, and combine to form tissues.

**Claim:** A theory is not a law.
**Counter:** Theories are composed of laws. However, like facts, laws don't explain phenomena to the scope of a theory. Newton's law of universal gravity is useful for measuring gravity's effect, but it's Einstein's theories of relativity that actually explain what gravity is and how it works.

# 1.2.1 - Abiogenesis

Scientific abiogenesis is a collection of theories about the origin of life, specifically involving life coming from non-life. The scientific consensus is that abiogenesis occurred sometime between 4.4 billion years ago to 2.7 billion years ago. This time range is chosen because it indicates when water vapor first liquefied and when the ratio of stable isotopes of carbon, iron, and sulfur would be adequate for allowing the oldest known forms of life.

The modern theory of abiogenesis is very different from the ancient idea that animals would spontaneously appear, fully formed, in food or rotting organic matter. Those notions were laid to rest thanks to several scientific experiments, especially those by Louis Pasteur (see *1.3.5 - Pasteur, Louis*).

### *Claims*

**Claim:** Pasteur proved that life can't come from non-life.
**Counter:** Pasteur only proved that the unscientific notion of fully-formed complex living organisms do not spawn from putrid matter (known as spontaneous generation). He said nothing about the building blocks of life forming from non-life.

**Claim:** Abiogenesis has been proven statistically impossible because the chances are far too rare for non-life to arrange itself into the pattern of life.
**Counter:** Using statistics to calculate how rare something is after the fact is pointless. For example, if you roll a six-sided-die 100 times and record the results the chance of getting the results that you recorded is astronomical ($6.5 \times 10^{77}$ to 1). However, even with those impossible odds, you got that sequence of rolls the very first time you tried it. Statistics are great for predictive odds, but they are useless for things that have already happened.

**Claim:** It's impossible for the building blocks of life to form randomly.
**Counters:**

- Meteorites that have landed on Earth contain simple sugars and amino acids which are the building blocks of life. This proves that the building blocks of life have occurred by random chance elsewhere in the universe.
- New molecules are being formed in the universe all the time because the universe is a very volatile place. There are nuclear fusion generating stars, exploding super novas, intense magnetic and radioactive fields, and extremely hot lightning striking billions planets trillions of time a second. These conditions make it much more likely that molecules, both simple and complex, will form.

**Claim:** Scientists can't come up with a way to explain how life could come from non-life.
**Counters:** Scientists have come up with several ways that life could come from non-life, including:

- In 1953, Stanley L. Miller and Harold C. Urey created an experiment to simulate pre-biotic conditions. Their experiment used the expected atmosphere of the Earth billions of years ago and coupled it with electric sparks to simulate lightning and UV radiation to simulate the sun. Under these conditions small molecules of amino acids, that are the building blocks of life, constructed spontaneously. This would lead to a primordial soup.
- In 1963, MIT molecular biologist Alexander Rich came up with the idea that would become the RNA World Hypothesis. The hypothesis states that the first life on Earth started as RNA based life and slowly evolved into DNA based life. Many parts of RNA based life could form spontaneously under pre-biotic conditions in a primordial soup.
- Through the 1950s and 60s biochemist, Sidney W. Fox, studied the spontaneous formation of peptide structures and demonstrated that amino acids could spontaneously form small peptides. These amino acids and peptides could be encouraged to form closed membranes which have the ability to form the early life.
- The Iron-Sulfur World Hypothesis was created by chemist Günter Wächtershäuser in the 1980s. The hypothesis states that life could have come into existence at the openings of underwater thermal vents. This would have occurred first from chemical reactions based on iron and

sulfur, and these reactions, when mixed with ammonia, would create amino acids and eventually peptides. This hypothesis has been updated by several other scientists who have shown it capable of creating many different types of amino acids and peptides.

- The Radioactive Beach Hypothesis, created by biochemist Zachary Adam, is based on the fact that the moon was closer to Earth billions of years ago. This would create concentrated uranium and other radioactive elements at tidal areas which would be capable of creating amino acids and sugars in the water.

**Claim:** Scientists haven't produced life from non-life, therefore abiogenesis is impossible.
**Counter:** It took nature about a billion years to create life from non-life. Biochemists have only been trying to create life from non-life for fewer than 100 years. However, the progress that scientists have made in the pursuit of abiogenesis has been invaluable to the field of biochemistry. They have proved that that amino acids, sugars, and peptides can form spontaneously under conditions similar to those of the early Earth. Saying that something is impossible just because nobody has done it yet seriously limits human achievement. Nobody flew before the Wright brothers, and yet they did even though most people said it was impossible.

**Claim:** The most basic form of life is bacteria, but even bacteria is amazingly complex.
**Counter:** The complexity of bacteria varies greatly. Rickettsia and chlamydia are so simple that they have been confused with viruses in the past—they can't even replicate themselves. Viruses are much simpler than bacteria, and prions are simpler still, yet they both have several characteristic of being alive. The theory of abiogenesis states that the precursors to life as we know it now would be similar to viruses and prions, only simpler. Much in the same way that the theory of evolution keeps getting stronger as more transitive fossils are discovered, abiogenesis is becoming stronger as biochemists get closer to creating a self-replicating molecule.

# 1.2.2 - Big Bang

The big bang is currently the predominate scientific theory regarding the earliest moments of the universe. The big bang theory incorporates the evidence of redshifted galaxies, the cosmic microwave background, and the abundance of light elements to theorize that the universe began during a very rapid expansion about 13.7 billion years ago. It details what the universe was like from just after the expansion began to present day and has been used to make several accurate predictions about the nature of the universe.

The result of redshifted galaxies means that most galaxies in the universe are moving away from each other. This form of expansion isn't easy to conceptualize, but you can make an example by putting marker dots on the outside of a balloon. These dots represent galaxies. Blowing up the balloon represents the passage of time. As the balloon inflates (time passes), the dots all move away from each other. This is similar to how galaxies can all be moving away from each other at the same time.

## *Claims*

**Claim:** There is no evidence for the big bang.
**Counter:** There are three major pieces of evidence that support the big bang theory. They are:

1. *Cosmic Microwave Background*—The CMB was theorized to exist as the heat remnants of the big bang. It was later measured using radio telescopes and adds the most weight to the big bang theory.
2. *Redshit*—Light measured from most galaxies in the universe is redshifted. According to the Doppler Effect, this means that most galaxies are moving away from us, and each other. This is evidence that the universe is expanding.
3. *Abundance of Light Elements*—There is an abundance of light elements throughout the universe which would most likely occur if the early stages of the universe match that of the big bang theory. The ratio between helium-4, helium-3, deuterium, and lithium-7 matches what would be expected in regard to the measurements made from the cosmic microwave background.

**Claim:** The big bang theory says that the universe came from nothing.
**Counter:** The big bang theory doesn't start until just after the universe began expanding, and therefore doesn't include anything prior to the beginning of the universe. There are other theories that address the cause of the big bang like the Hartle-Hawking state, but as of yet, no definitive answer exists. However, that doesn't meant that one will not be found.

**Claim:** The big bang theory states that all the matter in the universe once existed in a singularity.
**Counter:** According to the big bang theory, neither matter nor energy existed at the beginning of the big bang theory. It wasn't until after the initial expansion of the universe that energy formed and then cooled and collected into matter.

**Claim:** The big bang theory states that there was a huge explosion in space.
**Counter:** Prior to the big bang the universe didn't exist, so there wasn't any empty space to have an explosion in. The big bang itself was responsible for the creation of space. Also, the big bang theory doesn't claim there was an explosion, but instead there was a rapid expansion of the universe.

**Claim:** Explosions don't create order.
**Counters:** The big bang theory uses and expansion model, not an explosion, but this is irrelevant because explosions do create order. For example:

- Supernovas are responsible for fusing together all of the heavy elements in the universe.
- Powerful explosions will crush carbon into diamond crystals which have more order than common carbon alone.
- Tiny explosions in an internal combustion engine power the motor in an ordered fashion.
- Hydrogen bombs produce an explosion in the form of a mushroom cloud which has a distinctive ordered pattern.

**Claim:** If you can't explain what caused the big bang then it is entirely flawed.
**Counter:** We can't explain what caused the beginning of gravity either, but it's still very real. The big bang theory is very useful in understanding what the universe was like the moment after it began expanding, and it allows us to understand how structures are formed from very small atoms and molecules to very big stars and galaxy clusters.

# 1.2.3 - Evolution

Evolution is the theory that, over time, a species will change to best fit its environment because of mutations in reproduction guided by natural selection.

A simple way to explain evolution is to compare it to dog breeding. All domesticated dog breeds, like the Labradors and poodle, have been breed into existence by humans from a species of wild dog that lived thousands of years ago. Humans imposed conditions that inhibited reproduction of certain dogs so that those with desired traits were allowed to reproduce and those without desired traits are not. After many generations the result is a dog that is very different from its ancestor. This is called artificial selection. Natural selection occurs similar to this, except instead of humans dictating how the dog reproduces, nature does. It takes longer for changes to occur, but they still occur. Dogs who have traits that will help keep it alive to reproduce will be passed on.

When organisms reproduce mutations occur in their offspring because the copying of DNA is not perfect. According to natural selection, mutations that are beneficial to an organism's chances of survival will increase its likelihood to reproduce and pass on those beneficial mutations. Mutations that hinder an organism's chances of survival will decrease the organisms likelihood of reproduction and thus decrease its chances of passing on the hindering mutations. Over time these mutations will accumulate until the species is so different from its ancestors that it is declared a new species.

The theory of evolution has an overwhelming amount of evidence and, more importantly, the different lines of evidence are consistent; they all point to

the same big picture. For example, evidence from gene duplications in the yeast genome shows that its ability to ferment glucose evolved about eighty million years ago. Fossil evidence agrees because fermentable fruit fossils became prominent at about the same time. Genetic evidence around that time can also be found in fruiting plants and fruit flies.

## *Theory Claims*

**Claim:** Evolution is just a theory.
**Counter:** To a layman the word "theory" is synonymous with the word "guess", but in a scientific context, a theory is the most certain you can ever be. Gravity, atoms, and light waves are all theories as well. In science, a theory is a series of well-tested and peer-reviewed statements that explain a natural phenomena. Theories are the most important aspect of science because they don't simply just state facts, they explain the why and how facts are the way they are.

**Claim:** Evolution has not, and cannot be proved.
**Counter:** No real-world model can be definitively proved. Gravity cannot be definitively proved either, because it's possible that it will just spontaneously stop working tomorrow. Theories like gravity and evolution can only be given a degree of certainty and evolution has one of the highest degrees of certainty of all scientific theories.

**Claim:** Were you there? How can you be sure about evolution? You didn't see it happening.
**Counter:** Try using this argument in court against fingerprint and DNA evidence. Sure, the forensic investigators weren't there when it happened, but they are still able to put together a pretty good recreation of what transpired. How can we be sure our parents were born since we weren't there when it happened? We learn about our past by examining the evidence that survives to the present. You can figure out that your parent were born by examining their birth certificates. Historians read old books and study antiques to figure out what life was like long before they were born. Biologists and geologists examine fossil evidence and the genetic relationship between modern organisms to help them figure out what the past was like. This gives them a detailed history of evolution.

**Claim:** Evolution claims that humans came from monkeys.
**Counter:** Evolution does not claim that humans came from monkeys. Evolution claims that humans and apes evolved from a common ancestor about 200,000 years ago.

**Claim:** Evolution claims that animals magically transform into completely different animals.

**Counter:** Evolution makes no such claim. Evolution is a very gradual process that takes many generations of mutations through natural selection before any obvious changes are apparent.

**Claim:** If amphibians evolved from fish, there should be many in-between species living to this day, but there is a big difference between a fish and an amphibian.

**Counters:**

- This would only be true if species didn't become extinct. Extinction only widens the gap between species, it never makes the gap smaller. Also, fossils of these extinct intermediates are often found, like *Tiktaalik*, which is an intermediary from fish to amphibian.
- Most organisms only live in a small area where they are constantly inter-breeding. As evolution occurs, the genetic changes from the offspring are re-introduced into the species, causing the entire species to evolve as a whole. This prevents separate unique species from being left behind to form intermediates. However, when great distance or other barriers prevent the species from evolving as a whole, the species will have intermediates. Humans are a good example. Our evolutionary changes can be seen as we migrated from Africa to the surrounding land.
- A species isn't as distinct as fish versus amphibian. There are different intermediates that have features of each. A lungfish breathes air like an amphibian. The African clawed frog has much more webbing on its feet and hands than other frogs and lives almost exclusively in the water like a fish.
- There are many species where intermediates do exist. Jonathan Weiner's 1994 book *The Beak of the Finch: A Story of Evolution In Our Time* gives a good example. Herring gulls live in a large ring around the ice coast of the Arctic. The further they fly from their birth place along the coast in either direction, the less capable they are of successfully mating with the local gulls. They are completely unable to mate with the gulls on the far side of the Arctic ice coast. This shows a gradual change in species—all still living.

**Claim:** Changes may occur in animals "according to each kind", but not beyond that. There may be many different types of dogs, but they're all still dogs.

**Counter:** Biologists don't use the word "kind" because it is very vague and doesn't come close to explaining all the differences in living organisms. Instead they use a system of biological classification to identify organisms by species using their DNA and how they are capable of inter-breeding. For example, the layman may say that all fish are one "kind", but there are hundreds of different species of fish, most of which can't inter-breed with each other. For example, an Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) could never breed with a Ocellaris Clownfish (*Amphiprion ocellaris*). While they're both a "kind" of fish (they have fins, gills, etc.), they have evolved so differently that they're not even in the same order of taxonomy, let alone family, genus, or species.

**Claim:** Microevolution is possible, but not macroevolution.
**Counter:** Microevolution and macroevolution are words coined and used by Creationists, but not by scientists. Because evolution is evident in rapidly reproducing organisms like viruses and bacteria, Creationists had to address it. They submit that evolution at a micro level is present, but they argue that a macro change to where the organism would be categorized as a unique species cannot happen. However, they fail to offer a scientific explanation for what would prevent these changes from accumulating over time.

**Claim:** Evolutionists claim that life came from non-living things.
**Counter:** The theory of evolution only deals with organic life. The theory that life arose from non-life is called abiogenesis (see *1.2.1 - Abiogenesis*).

**Claim:** The theory of evolution is invalid because it doesn't explain how life came from non-life.
**Counter:** Neither does the theory of gravity, or the theory of quantum mechanics. No one theory explains everything in the universe. The theory of evolution only addresses living biological organisms. For information on life from non-life see *1.2.1 - Abiogenesis*.

**Claim:** Kent Hovind offers $250,000 to anyone who can prove evolution, but nobody has ever won the money.
**Counters:**

- Most of Kent Hovind's conditions for victory have little to do with the accepted scientific definition of evolution. Of his five points, 1 and 2 deal with cosmology and 3 and 4 deal with abiogenesis. His points include:
    1. Time, space, and matter came into existence by themselves.
    2. Planets and stars formed from space dust.
    3. Matter created life by itself.
    4. Early life-forms learned to reproduce themselves.
    5. Major changes occurred between these diverse life forms (i.e., fish changed to amphibians, amphibians changed to reptiles, and reptiles changed to birds or mammals).

  Although scientists are able to prove most of these points to a decent degree of certainty, Hovind states that a scientist must, "*prove beyond reasonable doubt that the process of Evolution ... is the only possible way the observed phenomena could have come into existence.*" This clause makes it impossible to win the prize since there are an infinite number of other possibilities, however unlikely, that could account for the observed phenomena.
- Using Hovind's criteria of proof—that no other options are probable—it would also be impossible to prove the theory of Gravity, but more importantly, and ironically, it makes it impossible to prove the existence of God.
- Hovind unfairly reserves the right to personally choose each member of the judging panel which could be biased in his favor. Also, the way

Hovind writes about the judges implies that he doesn't even have judges, but does the judging himself.

**Claim:** Most people in the US don't believe in evolution.
**Counters:** Likewise, most people in the US know very little about evolution and are not scientists. The majority of scientists favor evolution, especially those in life and earth sciences.

- *Table 1.2.3 A* shows the results of a 1997 Gallup poll which shows that majority of scientists favor evolution. However, this poll groups all scientists together, even those who don't specialize in fields related to evolution. If it only included fields of biology and geology, the number who believe in evolution without god would is even higher.
- The June, 1987 issue of Newsweek magazine stated "There are some 700 scientists with respectable academic credentials (out of a total of 480,000 U.S. earth and life scientists) who give credence to Creation-science…"That is about one one-thousandth of a percent (0.001%) who believe in Creation-science.

*Table 1.2.3 A - Belief In Evolution*

| Group | Believe In Creation | Believe In God-guided Evolution | Believe In Evolution Without God |
|---|---|---|---|
| Everyone | 44% | 39% | 10% |
| Just Scientists | 5% | 40% | 55% |

1997 Gallup Poll

*Table 1.2.3 B - Belief In Creation Science*

| Earth & Life Scientists | Total | Don't Believe In Creation Science | Believe In Creation Science |
|---|---|---|---|
| Total | 480,000 | 479,300 | 700 |
| Percent | 100% | 99.8% | 0.001% |

June, 1987 Newsweek

**Claim:** Evolution breaks the second law of thermodynamics by making order out of chaos.
**Counters:**

- This is a misinterpretation of the second law of thermodynamics. The second law only applies to closed systems. Life on Earth is not a closed system because it's constantly being given new energy from the sun.

- Even closed systems make order out of chaos as long as there is fuel. If you introduce some bacteria into a petri dish and then seal it off, the bacteria will continue to reproduce and create new order, even though the system is "closed". When they run out of food, only then will the die off and entropy will increase.
- If that were true, then a growing plant would also violate the second law of thermodynamics by starting with a basic seed and growing into a much more complex plant.
- Evolution does not create order from chaos, it alters existing order into a different form of order.

**Claim:** Complexity never naturally arises from simplicity.
**Counter:** Complexity naturally arises from simplicity all the time when energy is added. Here are some examples:

- A seed will form into a complex plant with a little sunlight and water.
- Adding a small amount of heat energy to water will cause it to boil which can be seen in geysers and underwater volcanoes. Boiling water is more complex than stagnant water.
- Intricate swirling patterns in like hurricanes and whirlpools form from basic laws of nature with heat from the sun.
- The rings of Saturn occurred from the basic laws of motion and gravity.

**Claim:** New information cannot be created through natural means.
**Counter:** New information is created by natural means every time mutations occur. For example, a strain of Flavobacterium was discovered in 1975 that consumes nylon. Nylon was not created until 1935 and within 40 years a strain of Flavobacterium naturally evolved three new enzymes to break down nylon and use it for energy. These new enzymes are not like any other enzyme from any other organism on Earth and contain information that has evolved through natural means.

**Claim:** Evolution is like a tornado in a junkyard assembling a 747 jet.
**Counter:** This is a poor analogy. Evolution does not take existing parts and instantly assemble them into an organism. Evolution occurs by making minor changes to existing traits of an organisms over time that alter their ability to survive in their environment.

**Claim:** Many great scientists like Babbage, Boyle, Brahe, Copernicus, Da Vinci, Faraday, Galilei, Herschel, Kelvin, Kepler, Linnaeus, Maxwell, Newton, Pascal, and Pasteur did not believe in evolution.
**Counter:** Darwin didn't formulate his theory of evolution until 1838. By then, half of these scientists were already dead, so they didn't have the chance to believe in evolution. Of those that lived in Darwin's time, Babbage, Faraday, Kelvin, and Maxwell were all mathematicians and physicists, so it's unlikely that they would have paid much attention to a brand new theory of biology. Louis Pasteur was the only biologist in this group who was also alive during Darwin's time. See *1.3.5 - Louis Pasteur.*

**Claim:** Scientists claim evolution changes life over time, but then why do they also claim that animals like turtles and sharks haven't changed for millions of years?
**Counter:** Natural selection favors evolutionary traits that help the animal survive in their environment. Many aquatic animals have remained relatively unchanged for millions of years because their environment has stayed the same for millions of years. There have been massive climate and terrain changes like those caused by ice ages and planetary shifts effect terrestrial animals greatly, but their effect on marine life is minimal.

**Claim:** Evolution cannot be a science because it isn't falsifiable.
**Counter:** Evolution is falsifiable because it makes many predictions, and those predictions can be proven false.

**Claim:** The theory of evolution doesn't make predictions.
**Counters:** The theory of evolution is very useful for making predictions, including the following:

- It was used to determine which levels of strata to search to find the fossil of *Tiktaalik* and it was found where predicted.
- Most great apes have 24 chromosomes, but humans have 23. Evolutionary theory predicted that one of our chromosomes would have the traits of two chromosomes fused together, and chromosome 2 was found to be fused thusly with twice as many telomeres and centromeres.
- Evolution predicts that female infidelity is highly likely in animal species with gaudy males. DNA testing proves this to be accurate.
- Predictions must be made by biologists to predict how bacteria and insects will evolve in order to create the next generation of antibiotics and pesticides.

## *Evidence Claims*

More claims can be found in *1.2.4 - Fossil Evidence*

**Claim:** There is no evidence of evolution.
**Counters:** The theory of evolution has an overwhelming amount of evidence, including:

- All life shows a fundamental unity in the mechanisms of replication, heritability, catalysis, and metabolism, indicating that all life is related.
- Common descent predicts a nested hierarchy pattern, or groups within groups. We see just such an arrangement in a unique, consistent, well-defined hierarchy, as viewed in the tree of life.
- Different lines of evidence give the same arrangement of the tree of life. We get essentially the same results whether we look at morphological, biochemical, or genetic traits.
- Fossil animals fit in the same tree of life. We find several cases of

transitional forms in the fossil record like *Tiktaalik*, *Archaeopteryx*, *Ambulocetus, etc.*

- The fossils appear in a chronological order, showing change consistent with common descent over hundreds of millions of years which is inconsistent with sudden creation.
- Many organisms show rudimentary, vestigial characters, such as sightless eyes on fish, wings useless for flight on birds, etc. These are expected as a species evolves.
- When atavisms occur they are consistent with an organisms' evolutionary history. Examples: hind legs on whales, hind fins on dolphins, extra toes on horses, tales on humans, etc. An atavism is the reappearance of a character present in a distant ancestor, but lost in the organism's immediate ancestors. Also, atavisms are consistent with fossil records. We see legs on whales, but not on fish, we see extra toes on horses, but not on starfish, etc.
- Ontogeny (embryology and developmental biology) gives information about the historical pathway of an organism's evolution. For example, as embryos whales and many snakes develop hind limbs that are reabsorbed before birth.
- The distribution of species is consistent with their evolutionary history. For example, marsupials are mostly limited to Australia (exceptions are explained by continental drift). Remote islands often have species groups that are highly diverse in habits and general appearance but closely related genetically. Squirrel diversity coincides with tectonic and sea level changes (Mercer and Roth 2003). Such consistency still holds when the distribution of fossil species is included.
- Evolution predicts that new structures are adapted from other structures that already exist, and thus similarity in structures should reflect evolutionary history rather than function. We see this frequently. For example, human hands, bat wings, horse legs, whale flippers, and mole forelimbs all have similar bone structure despite their different functions.
- The same principle applies on a molecular level. Humans share a large percentage of their genes, probably more than 70 percent, with a fruit fly or a nematode worm.
- When two organisms evolve the same function independently, different structures are often recruited. For example, the wings of birds, bats, pterosaurs, and insects all have the same function (flight), but they each have different structures. Gliding has been implemented in many additional ways. Again, this applies on a molecular level, too.
- The constraints of evolutionary history sometimes lead to suboptimal structures and functions which makes sense in an evolved history. For example, the human throat and respiratory system make it impossible to breathe and swallow at the same time and make us susceptible to choking. This also appears also on the molecular level. For example, a lot of DNA is nonfunctional.

- Some nonfunctional DNA, such as certain transposons, pseudogenes, and endogenous viruses, show a pattern of inheritance indicating common ancestry.
- Speciation has been observed in viruses, bacteria, protists, and insects.
- The day-to-day aspects of evolution—heritable genetic change, morphological variation and change, functional change, and natural selection—are seen to occur at rates consistent with common descent.
- A strain of Flavobacterium was discovered in 1975 that consumes nylon. Nylon was not created until 1935 and within 40 years a strain of Flavobacterium naturally evolved three new enzymes to break down nylon and use it for energy. These new enzymes are not like any other enzyme from any other organism on Earth.

**Claim:** If humans evolved from apes, then why are there still apes?
**Counters:**

- Evolution does not claim that humans came from apes, it claims that humans and apes have a common ancestor several hundred thousand years ago. Both still exist because they were separated geographically, and then evolved to their particular environments.
- This question can be likened to asking, "If Americans and Australians came from Europe, why are there still Europeans?

**Claim:** Humans are nothing at all like apes.
**Counters:**

- Humans share around 94%-99% of their DNA (depending on the testing method) with chimpanzees.
- Bonobo chimpanzees are very similar to humans. They can recognize themselves in mirrors, they have social hierarchies, they have sex in the missionary position, they masturbate, they can communicate with humans via sign-language, they use tools, they have altruistic behavior, and they have empathy towards other living things.
- See *3.1.6 - Man* for more info.

**Claim:** If humans are related to apes, why do all apes have 24 chromosomes, but humans only have 23 chromosomes?
**Counter:** Evolutionists predicted that one of our chromosomes would have the traits of two chromosomes fused together. After studying human chromosome, they found that #2 was fused with twice as many telomeres and centromeres, just as predicted by evolution.

**Claim:** Random mutations would take too long for advanced life to evolve.
**Counter:** While the mutations may occur at random, natural selection, which grants the most suited mutations to create offspring, removes most of the random element from the equation, greatly increasing the speed of evolution compared to chance.

**Claim:** The biochemist Michael Behe wrote that evolution can not explain the human immune system.
**Counter:** During the Kitzmiller v. Dover trial of 2005, Michael Behe was shown a stack of books and papers that many biologists had written on the subject of how the human immune system evolved. When asked, and asked if he had read any of them, he admitted that he had not.

**Claim:** Certain body parts, like the eye, wing, or bacterial flagellum are irreducibly complex and could not have evolved because half an eye or wing is useless.
**Counters:**

- This is an argument to ignorance. Half a wing or eye isn't useless just because you can't think of a way it could be useful. Likewise, just because you can't think of a way they evolved, doesn't mean they must have been designed.
- Evolution shows that organs like eyes don't happen by putting parts of an eye together. They happen by having something like a proto-eye, with little function, evolving into a more functioning eye, through many generations.
- The eye probably formed from naturally selected organisms that first developed light-sensitive nerve cells, which would be helpful in finding shelter. These cells became numerous which would be more helpful. An indentation in the middle of these cells would allow for better direction sense. A lens covering the hole would allow for a more descriptive view. The steps take time, but in each step the eye was more useful. Furthermore, In the animal kingdom we can see examples of each of the different types of eyes as they would have evolved.
- Ask an ostrich or penguin if half a wing is useless. They can't use their wings for flight, but an ostrich uses its wings for balance and turning while running, the penguin for swimming. Likewise, flying squirrels and sugar gliders have flaps of skin that are used for gliding.
- The bacterial flagellum probably evolved from a type III secretory system, which is similar to the flagellum, only it's missing a few parts (also proving that the flagellum is not irreducibly complex). Many other scientists have shown how the flagellum may have evolved via exaptation, like in Kenneth Miller's book "The Flagellum Unspun".

## *Religious Claims*

More claims can be found in *3.1.4 - Creationism*.

**Claim:** Evolution is a religion because it cannot be tested and must be believed via faith.

**Counters:**

- Evolution can be, and is, tested by scientists all the time. It can be watched in organisms that reproduce rapidly like bacteria and insects. Because evolution can be witnesses and tested, it is empirical and falls under the realm of science.
- Evolution can be observed in the long line of detailed fossil records we have, also making it a science.
- The recent practice of selective breeding, including domestication and agriculture, is also proof of evolution. Although humans are the primary cause of breeding, it is proof of how mutations affect offspring and how, when the reproduction process is influenced, very different results can be made.
- Viruses evolve very rapidly. Each year new flu vaccines have to be made because the virus has evolved so much. HIV continually alludes a cure because it evolves so quickly.

**Claim:** Evolution goes against the teachings of religious scripture.
**Counter:** There are many interpretations of religious scriptures. While evolution may go against some extreme fundamentalist interpretations, it doesn't go against more reasonable interpretations. There are many religious groups who believe that evolution can fit their religious views. Pope John Paul II even said the evolution was "more than [a] hypothesis."

**Claim:** Evolution is not in the bible, therefore it is not true.
**Counter:** The bible is a spiritual book for the masses, not an in-depth book of science or technology. The bible doesn't mention general relativity or quantum mechanics, it doesn't talk about carburetors or crankshafts—there are many things that are real and true that are not in the bible.

**Claim:** Evolutionist are immoral.
**Counters:**

- There are no unbiased studies to show the morality of evolutionist over any other group. However, there are surveys which show that the more education a person receives, the more likely they are to believe in evolution. See *Table 1.2.3 A*.
- This is an *ad hominem* argument. The morality of proponents of a theory do not alter the validity of the theory.

**Claim:** Evolution fails in the legal arena like in the Scopes v. State trial which made it illegal to teach evolution in Tennessee schools.
**Counters:** The Scopes trial occurred in 1925. Since then, evolution has consistently been winning against Creationism and Intelligent Design in US courts. Here is a list of the more important trials where evolution won:

- 1968—Epperson v. Arkansas, United States Supreme Court
- 1981—Segraves v. State of California, Supreme Court of California
- 1982—McLean v. Arkansas Board of Education, U.S. Federal Court
- 1987—Edwards v. Aguillard, United States Supreme Court

- 1990—Webster v. New Lenox School District, Seventh Circuit Court of Appeals
- 1994—Peloza v. Capistrano Unified School District, Ninth Circuit Court of Appeals
- 1997—Freiler v. Tangipahoa Parish Board of Education, United States District Court for the Eastern District of Louisiana
- 2000—Rodney LeVake v. Independent School District 656, et al., District Court for the Third Judicial District of the State of Minnesota
- 2005—Kitzmiller v. Dover Area School District, US Federal Court
- 2006—Hurst v. Newman US District Court Eastern District of California

# 1.2.4 - Fossil Evidence

Fossils form when organic matter is replaced with minerals over a long period of time and a replica of the original tissue is preserved. This happens only under ideal conditions which is why there are so few fossils. It also rarely occurs with soft tissue, which is why most fossils are of bones. Fossils exist in all shapes and sizes from tiny microbes to enormous trees and dinosaurs. Fossils are very important because they allow us to see what life was like millions and even billions of years ago. Fossils can be dated with a number of techniques including measuring the trace amount radioactive material in them, and using their half-life to accurately calculate their age.

## *Claims*

**Claim:** All known fossils of ancient humans would fit on a billiard table.
**Counter:** This may have been true many years ago, but paleontologists continue to uncover more and more fossils and the collection of hominid fossils has become quite substantial. In 1992, Marvin Lubenow counted close to 4,000 hominid individuals cataloged since 1976. By 1999 Handprint Media listed 150 *Homo erectus* individuals, 90 *Australopithecus robustus*, 150 *Australopithecus afarens*is, and 500 *Neanderthals*.

**Claim:** All early hominid fossils are either fully human or fully ape.
**Counters:**

- Even an unskilled observer can infer that the skeletons are an obvious gradual evolution from an ape-like ancestor to a more modern human appearance. The teeth get smaller and less pointy, the brain cavity gets larger, the face protrudes less, the brow slopes less, the nose extrudes more, the spine become more upright, etc.
- The fossil record shows gradual changes along the hominid lineage and it progresses through Early *Australopithecus afarensis*, Late *Australopithecus africanus*, *Homo habilis*, Early *Homo erectus*, Late

*Homo erectus*, Early *Pleistocene Homo sapiens*, and finally to us, Late *Pleistocene Homo sapiens*, and the intermediate fossils in between each stage.

**Claim:** Neanderthals were just humans with arthritis, rickets, or disfigurement.
**Counters:**

- *Homo neanderthalensis* no doubt suffered from arthritis just like most other animals, but even severe arthritis doesn't account for the vastly different bone structure.
- Rickets tend to cause weaker bone regions, but Neanderthals all have very thick and strong bones.
- There are over 70 different sites where Neanderthal fossils have been found, often times with multiple specimens per site. All of the fossils are consistent. It seems highly unlikely that somehow all of the specimens had arthritis and rickets, and much more likely that their bone structure was just different from *Homo sapiens*.

**Claim:** The fossil record is missing many transitional forms which disproves evolution.
**Counters:**

- This is a typical "god of the gaps" argument. For every missing transitional form, critics of evolution claim that it is proof that the entire theory is faulty. However, as new fossils are uncovered, these gaps continue to shrink and our modern fossil record is more than complete enough to prove evolution.
- Scientists predicted that amphibians evolved from early fish, birds evolved from early reptiles, and whales evolved from an early land mammal. *Tiktaalik* filled in the gap between fish and amphibians, *Archaeoptryx* filled the gap between reptiles and birds, and *Rodhocetus* filled the gap between land mammals and whales.
- Each time a new transitional fossil is found Creationists claim that it isn't proof. They claim that *Tiktaalik* is just a fish with a flat head, *Archaeoptryx* is just a reprile with feathers, and *Rodhocetus* is just a whale with legs. They make these claims in contradiction to the scientific community who has reached a consensus that they are transitional fossils.

**Claim:** Fossils didn't start showing up until the Cambrian explosion when many complex animal fossils seem to have suddenly appeared spontaneously which is consistent with Creationism.
**Counters:**

- There are numerous fossils prior to the Cambrian period.
- The Cambrian period is when hard shells and bones started evolving. Shells and bones fossilize much better than the soft tissue of earlier life which is why few fossils exist before the Cambrian period, and so many appear during and after it.
- The so-called "sudden" appearance of fossils occurred in a period of

around 5-10 million years. This is sudden in a geological sense, but not at all as sudden as literal six-day Creationism. Furthermore, the fossil record for this period shows the organisms gradually evolving harder shells and bones and slowly becoming more numerous near the end, adding more weight to evolution.

- The beginning of the Cambrian period also marked the end of an ice age which created more favorable conditions for land life to flourish and have more chances at creating fossils.

**Claim:** Fossils are dated by the layer of strata they're found in, and the layers of strata are dated by the fossils found in them. This is circular reasoning.
**Counter:** Strata layers are only one of the many methods used by Paleontologists to measure the age of fossils. They use radiometric dating on the layers of strata to determine how old they are because erosion can alter the layers of strata.

**Claim:** An 80-foot-long whale fossil was found near Lompoc, California standing vertically through over a million years of strata. This could only occur through a very fast and very thick layer of sediment, something akin to the Great Flood.
**Counter:** The whale wasn't found vertically it was found at about a 45° angle. However, it was found parallel to the strata—not through multiple layers—indicating that it was horizontal when it was covered. It was the strata itself that was tilted 45°, due to the normal movements of continental drift and earthquakes.

**Claim:** Over 200 fossils have been found to be in a completely different layer of strata than it should be.
**Counters:**

- Few fossils are actually found in the wrong layer of strata. Some have eroded into surrounding layers, or fallen from rock faces into different areas. These are sometimes prematurely reported as being found in the wrong place, but paleontologists are capable of forensically figuring out where they really came from based on their immediate surrounding strata, radiometric dating, and environmental wear.
- Even if there were around 200 anomalies, that isn't even a millionth of a percent compared to the 250 million cataloged fossils, and millions more that await cataloging. They are statistically irrelevant.

**Claim:** Modern pollen can be found in rocks that geologists claim are extremely old.
**Counters:**

- Most of these tests were performed by Clifford Burdick, a Creationist with little geological knowledge of how to properly extract rock samples without contaminating them. Geologists, skilled in taking rock samples, rarely contaminate their samples with pollen.
- Because pollen is so small, it can easily be blown into tiny cracks of

rock. However, modern pollen is obviously identifiable since pollen slowly darkens over time and it flattens as the rock compresses around it.

**Claim:** Fossils can be rapidly formed in nature through calcification, amber, petrified wood, etc. Thus, the earth doesn't have to be very old.
**Counters:**

- Calcification is not the same as fossilization. Calcification merely coats the object in calcium, where fossils occur when the original organism is actually replaced with minerals over millions of years.
- Although organisms are still getting trapped in tree sap, it takes millions of years for amber to properly set and harden.
- If all of Earth's fossils are only a few thousand years old, then every inch of the Earth would have to be completely covered in animals to create the millions and millions of unique species found in the fossil record. The Earth would not be able to support such a diverse ecology.
- Many different dating methods independently date fossils back millions and billions of years.

# 1.2.5 - HIV/AIDS

HIV (human immunodeficiency virus) is a lentivirus (part of the retrovirus family) that affects primates. It uses the primate immune system to replicate itself, while at the same time destroying it. Over time, HIV sufferers will develop AIDS (acquired immunodeficiency syndrome). AIDS is the name for the various symptoms and diseases that become more prevalent once HIV has compromised its host's immune system.

## *Claims*

**Claim:** HIV/AIDS was created by God to punish homosexuals and immoral people.
**Counters:**

- HIV is a completely indifferent virus that affects people regardless of religion, sexuality, or ethnicity.
- If God really did create HIV to punish immoral people, it should only affect immoral people. Thusly, we should be able to inject HIV infected blood into devoutly religious people and they should not develop the virus.
- How then do you explain that homosexual females have lower rates of HIV than both heterosexual males and females? (Osborn B, 2003)

**Claim:** HIV/AIDS can be cured.
**Counter:** There is no clinical proof to show that anything can cure HIV (or any other virus for that matter). There are only treatments that can be used to slow the virus.

**Claim:** HIV/AIDS was manufactured by a government/terrorist organization for germ-warfare. It was accidentally/purposely released on the earth. The creator has/doesn't have a cure for it.
**Counter:** Because this claim is so extraordinary, an extraordinary amount of proof would be needed to support it, and, of course, none exists.

**Claim:** HIV doesn't exist, or is a harmless carrier virus and doesn't cause AIDS. AIDS is caused by recreational drug use, malnutrition, and antiretroviral drugs.
**Counter:** There are some claims that try to discredit the link between HIV and AIDS, most of which are far-fetched or bizarre. The more reasonable ones are based off of tests done in the mid-to-late 1980s, prior to our current understanding of the virus. The fact that HIV causes AIDS is a consensus under the scientific community as seen in the Durban Declaration which states that the evidence that HIV causes AIDS is "clear-cut, exhaustive and unambiguous." The document was signed by over 5,000 physicians and scientists at the 2000 International AIDS Conference.

# 1.2.6 - Homosexuality

Homosexuality is the exclusive sexual attraction to members of the same sex. There are many claims made about people with homosexual tendencies.

## *Claims*

**Claim:** Homosexuality is a choice.
**Counters:** There are several known biological differences between homosexuals and heterosexuals which indicate that homosexuals cannot choose to be straight anymore than heterosexuals can choose to be gay.

- Several studies show that women with unusually high androgen levels during fetal development have more masculinized sex role identities and are more likely to have a homosexual orientation as adults than controls (Dittmann et al. 1990ab, 1992; Zucker et al., 1996; Hines et al., 2004).
- In 1991, neuroscientist Simon LeVay published a paper explaining that he found that, after examining the the size of the INAH3 group of neurons in the hypothalamus, the majority of the homosexual male INAH3 groups were smaller than those of heterosexual males, and closer to the size of females.

- Studies performed by Ivanka Savic in 2002, and again with the help of Hans Berglund, and Per Lindström in 2005, show that the brains of homosexuals respond the same way to same-sex pheromones that the brains of heterosexuals respond to opposite-sex pheromones.
- J.M. Bailey and R.C. Pillard gathered statistics on twins from 1991 to 1993 where at least one of the siblings were homosexual. Their data shows that the chances of both twins being homosexual is over twice as likely among identical twins compared to fraternal twins, indicating that some cases of homosexuality are genetic, and thus, not a choice.

**Claim:** Homosexuals are immoral.
**Counter:** There are no studies that link homosexuality to immorality. Therefore this claim is unfounded. Many Abrahamic religious groups claim that the act of homosexuality is in itself immoral. However, consensual homosexual sex doesn't cause physical or psychological harm, thus not making it immoral by reasonable people.

**Claim:** Homosexuals are not fit to run a family.
**Counters:**

- The *Resolution on Sexual Orientation, Parents, and Children* compiled by the American Psychological Association in 2004 states: "*There is no scientific evidence that parenting effectiveness is related to parental sexual orientation: lesbian and gay parents are as likely as heterosexual parents to provide supportive and healthy environments for their children.*" It also states, "*Research has shown that the adjustment, development, and psychological well-being of children is unrelated to parental sexual orientation and that the children of lesbian and gay parents are as likely as those of heterosexual parents to flourish.*"
- Same sex couples as parents are advocated by the following groups: the American Psychological Association, the Child Welfare League of America, the American Bar Association, the American Psychiatric Association, the National Association of Social Workers, the North American Council on Adoptable Children, the American Academy of Pediatrics, the American Psychoanalytic Association, and the American Academy of Family Physicians.
- The *Children's Development of Social Competence Across Family Types*, compiled in 2006 by the Canadian Department of Justice states: "*The strongest conclusion that can be drawn from the empirical literature is that the vast majority of studies show that children living with two mothers and children living with a mother and father have the same levels of social competence. A few studies suggest that children with two lesbian mothers may have marginally better social competence than children in traditional 'nuclear families', even fewer studies show the opposite, and most studies fail to find any differences. The very limited body of research on children with two gay fathers supports this same conclusion.*"

**Claim:** Homosexuals are more likely to be pedophiles so they must be kept out of schools, the Boy Scouts of America, etc.
**Counters:**

- In the 1982 book *The Child Molester: Clinical Observations*, child abuse specialist Dr. A. Nicholas Groth wrote, "*Are homosexual adults in general sexually attracted to children and are preadolescent children at greater risk of molestation from homosexual adults than from heterosexual adults? There is no reason to believe so. The research to date all points to there being no significant relationship between a homosexual lifestyle and child molestation. There appears to be practically no reportage of sexual molestation of girls by lesbian adults, and the adult male who sexually molests young boys is not likely to be homosexual.*" He also wrote, "*Homosexuality and homosexual pedophilia are not synonymous. In fact, it may be that these two orientations are mutually exclusive, the reason being that the homosexual male is sexually attracted to masculine qualities whereas the heterosexual male is sexually attracted to feminine characteristics, and the sexually immature child's qualities are more feminine than masculine… The child offender who is attracted to and engaged in adult sexual relationships is heterosexual. It appears, therefore, that the adult heterosexual male constitutes a greater sexual risk to underage children than does the adult homosexual male.*"
- Many studies simply assume that just because a male sexually molested a boy, that they must be gay. However, most pedophiles are not attracted to adults at all, male or female. This is the subject of Dr. Nathaniel McConaghy's 1998 work. He stated that, "*The man who offends against prepubertal or immediately postpubertal boys is typically not sexually interested in older men or in women.*"

**Claim:** Timothy J. Dailey, Ph.D. wrote a document called *Homosexuality and Child Abuse* that was published by the Family Research Council which cites many studies that prove that homosexuals are more likely to be pedophiles.
**Counters:**

- Dailey has no formal education in psychology or human sexuality. His degrees are in theology and bible study.
- Many of the studies Dailey cites are poorly conducted and don't address the issue of pedophiles being attracted to adult males, female children, or adult females. Without a clear basis on what gender and age group a person is attracted to one can't properly discern their sexual preference, and therefore, one cannot accurately call them homosexual.
- Some of the studies cited actually indicate the opposite of Dailey's message.

**Claim:** Homosexuality doesn't exist in nature.
**Counters:** Biologists have observed homosexual behavior in about 1,500 different species of animals, and of those, about 500 are well documented. Some specifics include:

- Male big-horn sheep will lick each others genitals and have anal intercourse with each other.
- Giraffes, bottlenose dolphins, Orcas, gray whales, and West Indian manatees all have male orgies.
- Japanese macaques have large lesbian groups.
- Bonobo females have homosexual sex very often, and males involve themselves in frottage.
- An estimated one fourth of all black swan couples are homosexual.
- American Bison exhibit courtship behavior, mounting, and anal intercourse between males.
- About 45% of the sexual behavior of African and Asian elephants is homosexual.

# 1.2.7 - Ideomotor Effect

The ideomotor effect is a well documented psychological phenomenon that manifests itself in an involuntary movement caused by an idea or thought rather than sensory stimulation. In simple terms: our bodies make tiny movements that we are unaware of whenever we think of certain things, be they conscious or subconscious. These movements are so small that we usually don't notice them ourselves, but if we are holding something that moves with the slightest tremor or attached to a perceptive machine, the movement is amplified. Anyone who is unaware of the ideomotor effect may easily conclude that the device moved on its own.

As such, the ideomotor effect is partially responsible for the results seen in dowsing (see *2.1.4 - Dowsing*), Ouija boards (see *2.1.11 - Ouija Boards*), pendulums (see *2.2.12 - Pendulums*), facilitated communication, applied kinesiology, automatic writing, and other assorted forms of paranormal activity where the practitioner uses their own body to control something.

Most operators of paranormal devices don't know about or don't believe that the ideomotor effect is the cause of the results they get with their paranormal devices. However, the effect can easily be proven by performing a double-blind test. For example, blindfold the operators of a Ouija board, and then rotate the board a random number of degrees and the operators will spell out gibberish. Dowsers in proper double-blind tests have an accuracy of chance. Blindfold operators of facilitated communication cause their subjects to spell gibberish, etc.

# 1.2.8 - Vaccination

Vaccinations are created from dead, weakened, or partial diseases and are used to purposely infect people so that the person's immune system can create

antibodies to fight the disease before being subjected to a full-strength disease. Vaccinations are the primary factor in decreasing the infant mortality rate in the world and have been used successfully for centuries.

### *Claims*

**Claim:** Vaccinations cause autism.
**Counter:**

- Doctors have yet to figure out what causes autism.
- No clinical tests show a link between vaccinations and autism.
- A Danish study from 1991 to 1998 of 537,303 children showed that the percentage of children who developed autism or autism-spectrum disorders was the same whether or not the child received the MMR (measles, mumps, rubella) vaccine.

**Claim:** Vaccinations contain mercury which can cause autism.
**Counters:**

- There is no evidence to suggest that mercury causes autism.
- Thimerosal, a preservative used in some vaccines, contains only an extremely small amount of mercury.
- If you take into account all of the vaccines that the average two-year-old receives, it totals to about 237.5 micrograms of mercury. That is equivalent to eating about fourteen 6 oz. Cans of tuna fish. Such a small amount has never been shown to cause adverse effects in humans of any age.
- In 1999, due to the public fear of mercury, the CDC began eliminating Thimerosal from all common children vaccines. Since 2001, except for some influenza vaccines, Thimerosal is not used in any routine children's vaccinations.
- Thimerosal has been in use since the 1930s at and decreased in 1999. The rate of autism has been going up in spite of the decrease in Thimerosal indicating that the two are most likely unrelated.

**Claim:** Some children are especially sensitive to mercury.
**Counter:** Parents with autistic children are assuming that their children are sensitive to mercury only because their child has autism. This is circular reasoning. They don't actually test their children to prove their statement because the test means putting more mercury into their child's body.

# 1.3 - Scientists

Many scientists throughout history have given us wonderfully beneficial advancements in our lives. They have used their extraordinary minds to help us

understand the world around us. Yet, even with their great advances, many people spite them or twist their words around. This section covers the erroneous claims attributed to the great scientists of the human race.

# 1.3.1 - Darwin, Charles

Charles Darwin (February 12, 1809—April 19, 1882) was an English geologist who is best known for the formulating the theory of evolution.

**Claim:** In *The Origin of Species*, Darwin didn't believe that the eye could have evolved naturally.
**Counter:** Darwin wrote that the eye did indeed evolve naturally. The quote that Creationists take out of context is, "*To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree.*" However, if you finish the quote, "*Yet reason tells me, that if numerous gradations from a perfect and complex eye to one very imperfect and simple, each grade being useful to its possessor, can be shown to exist…*" Darwin then goes on for several more pages explaining how the eye evolved naturally.

**Claim:** Lady Hope said that Darwin recanted evolution on his deathbed.
**Counters:**

- This is most likely pious fraud. Lady Hope was not present during Darwin's death, but Darwin's children were, and they claim nothing of the sort. Lady Hope may have visited Darwin several months before his death, but there is no evidence that Darwin had such a conversation with her.
- It doesn't matter if Darwin recanted his theory of evolution. All that matters is that there is very strong evidence to support evolution.

**Claim:** Darwin was a racist who referred to Africans as savages and used the term "favoured races".
**Counters:**

- Everyone in Darwin's time and culture referred to Africans as savages, including Creationists. The Creationist Louis Agassiz even claimed they were a different species. However, even with the pro-white view of the culture of the time, Darwin was still more progressive than most. He opposed slavery and contributed to missionary work.
- The mention of "favoured races" in the subtitle of *Origin of Species* refers to variations within species which survive to leave more offspring, not the various "races" of humans. It does not imply racism.

- The views of Darwin, or of any person, are irrelevant to the fact of evolution. Evolution is based on evidence, not on people's opinions.

# 1.3.2 - Dawkins, Richard

Richard Dawkins (March 26, 1941—) is a British microbiologist known for popularizing evolution, atheism, and rational thinking.

**Claim:** In an interview in 1997, Richard Dawkins was asked to "*give an example of a genetic mutation or an evolutionary process which can be seen to increase the information in the genome.*" Apparently unable to answer, he paused a long time and finally responded by changing the subject.
**Counter:** The long pause comes from the fact that Dawkins was misled by his interviewers. When he realized that they were actually Creationists deceiving him, he paused to think about how to handle them. The changing of the subject is because the Creationists edited out a length of dialog where Dawkins confronts them about misleading him.

# 1.3.3 - Einstein, Albert

Albert Einstein (March 14, 1879—April 18, 1955) was a German physicists best known for his theories of general relativity and special relativity.

**Claim:** Albert Einstein was a Christian because he mentioned God several times.
**Counters:**

- When asked by Rabbi Herbert S. Goldstein in 1929 if he believed in God, Einstein replied, "*I believe in Spinoza's God, Who reveals Himself in the lawful harmony of the world, not in a God Who concerns Himself with the fate and the doings of mankind.*"
- In a letter to an atheist in 1954, Einstein responded to claims made about his beliefs by saying, "*It was, of course, a lie what you read about my religious convictions, a lie which is being systematically repeated. I do not believe in a personal God and I have never denied this but have expressed it clearly. If something is in me which can be called religious then it is the unbounded admiration for the structure of the world so far as our science can reveal it.*"
- In a 1954 letter to Eric Gutkind, Einstein wrote, "*The word God is for me nothing more than the expression and product of human weaknesses, the Bible a collection of honorable, but still primitive legends which are nevertheless pretty childish. No interpretation no matter how subtle can (for me) change this. These subtilized interpretations are highly*

*manifold according to their nature and have almost nothing to do with the original text. For me the Jewish religion like all other religions is an incarnation of the most childish superstitions.*"

# 1.3.4 - Linnaeus, Carl

Carl Linnaeus (May 13, 1707—January 10, 1778) was a Swedish biologist best known for the creation of modern taxonomy and the creation of Binomial nomenclature.

**Claim:** Carl Linnaeus was a Creationist.
**Counter:**

- Linnaeus was a Creationist, but he died long before Darwin published his theory of evolution and longer still before the conception of the big bang theory or abiogenesis.
- Linnaeus's work of creating hierarchical arrangements of plant and animal traits was actually very helpful to proving evolution.
- Linnaeus placed humans in the same order as monkeys showing that as far as the evidence was concerned, he believed that humans were primates.
- In *Disquisitio de Sexu Plantarum* Linnaeus says, "*It is impossible to doubt that there are new species produced by hybrid generation.*" Showing that he at least believed in evolution within a genus.

# 1.3.5 - Pasteur, Louis

Louis Pasteur (December 27, 1822—September 28, 1895) was a French biologist best known for his work with in germ theory.

**Claim:** Pasteur was a strong advocate against evolution.
**Counter:** Although Pasteur may not have believed in evolution, he made no passionate arguments against it. Also, Pasteur's discovery of germ theory has been very helpful for biologists to understand evolution.

**Claim:** Pasteur proved that the idea of bacteria suddenly appearing in non-living matter (spontaneous generation) was invalid, thereby proving evolution wrong.
**Counter:** Evolution does not, nor did it ever, use spontaneous generation. The theory of evolution deals only with living organisms. Life from non-life is explained by abiogenesis (see *1.2.1 - Abiogenesis*).

# 2.0 - Pseudosciences

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Pseudosciences are areas of study that are considered scientific by their practitioners, but not regarded as science by the scientific community. This is because the people studying them do not use the scientific method, or use it in a lax way. They also rarely conduct clinical trials or subject their work to peer review.

## *Claims*

The following are common claims that apply to nearly every pseudoscience. What these claims have in common is an ignorance of the how and why scientific information is gathered the way it is (see *1.1 - Process*). People who are not familiar with the scientific method or clinical procedures will also not know why those rules are in place, and in turn, skip them when gathering and interpreting their own data.

**Claim:** What do you care if people believe in ____? They're not harming anyone.
**Counter:** A strong belief in something that is completely irrational and unproven often does harm people. It gives people false hope in a miracle cure that doesn't work, people refuse proven effective treatment and opt for quackery, the military gives their soldiers bomb detectors that are ineffective, it

takes away funding that could be spent on conventional proven research that will more likely result in benefits for everyone, companies profit off of the naïveté of others, etc.

**Claim:** ____ works because it has satisfied customers.
**Counter:** Every test of placebos also has satisfied customers, but that doesn't mean the customers were actually helped. Treatments must be shown to consistently work in a clinical peer-reviewed test in order to eliminate possible placebo effects.

**Claim:** I don't know how ____ works, I just know that it does.
**Counter:** This is the pragmatic fallacy of logic. If you don't know how something works than you can't be sure whether or not the outcome was caused by what you did or from some other outside force that you didn't anticipate. Proper tests must be conducted to isolate the variables to test them individually.

**Claim:** ____ works because a test showed it to work.
**Counter:** A single test is not the end-all be-all of proof. The test must be critically reviewed by peers, and repeated over and over again to ensure that it does indeed work.

**Claim:** ____ is so complex that the scientific method can't apply to it.
**Counter:** The scientific method is so accommodating that it can apply to any phenomena that has an observable outcome.

**Claim:** ____ is so complex that it can't be tested in a clinical setting.
**Counter:** Clinical settings can be devised to emulate any environmental factor, and can be used to show the results of any treatment, no matter what the effect.

**Claim:** ____ is supernatural, and therefore beyond the realm of science.
**Counter:** While ____ itself may be supernatural, the effects that it has on the real world are natural and therefore fall under the realm of science. They can and should be tested to see what natural cause (if any) could be the real culprit.

**Claims:** ____ won't work because there are non-believers present.
**Counter:** Morphine will numb a person's pain even if everyone watching doesn't believe it. Polaris (the north star) will point north regardless of who disagrees. What makes ____ so special that it only works provided everyone believes that it does?

**Claim:** ____ works better when you have an open mind and believe that it will help you.
**Counter:** Aspirin relieves pain even if you believe it doesn't, water hydrates you the same even if you believe it doesn't. What makes ____ so special that it works better when you believe it will?

**Claim:** You're not an expert on ____, so you are not qualified to pass judgment.
**Counter:** I don't claim to be an expert. I'm not a mathematician either, but I still know that 2 + 2 = 4. It doesn't take an expert to have basic critical thinking skills and understand the fundamentals of evidence and proof. Your claims and methods contradict the scientific consensus and therefore your burden of proof becomes that much larger.

**Claim:** ____ is a very ancient technique.
**Counter:** As a general rule, the older a technique is, the less effective it is. This is because the further back in time you go the less humans understood the natural world. They didn't know about bacteria, viruses, parasites, that the brain is the seat of consciousness, that blood flows through the body, etc. The less you know about the natural world, the harder it is to make techniques to accurately affect it.

# 2.1 - Pseudosciences

This is an alphabetical list of the more common pseudosciences, and common claims made about each of them.

# 2.1.1 - Acupuncture

Acupuncture is a Chinese form of therapy involving inserting and manipulating needles into a body at various points and meridians to affect the flow of qi (also spelled ch'i, hei, ki, khi, etc.). The roots of acupuncture can be traced back thousands of years, but the oldest clear evidence dates to around 100 BCE.

The treatment has become much more popular over the years, and schools that teach acupuncture can be found in most countries. Acupuncturist perform on most living things including adults, children, infants, animals, and even plants.

Acupuncture does have a measurable and favorable effect, but this effect has nothing to do with qi or meridians. Instead the favorable effect comes from endorphins that are released during the procedure. Ideas of qi and meridians existed before doctors understood anything about the circulatory system, the nervous system, or modern germ theory, and they have not been updated since.

## *Claims*

**Claim:** Acupuncture affects the flow of qi in a person's body
**Counter:** The concept of qi was postulated long before any modern knowledge of human anatomy. The presence of qi has never been measured, and nobody can give a scientific definition for it to explain and test it. Also, even if qi did exist, there is nothing to prove that stabbing a patient's body will somehow alter their qi.

**Claim:** Acupuncture is a safe alternative to medicine.
**Counter:** Making puncture wounds, even very small ones, on the body leaves you more susceptible to infections. Also, just like tattoo needles, you can catch diseases from improperly cleaned acupuncture needles.

**Claim:** Acupuncture has been proven to help relieve pain.
**Counter:** Many tests of acupuncture show that it relieves pain, but not for the reason that practitioners claim. A 2005 study at the Centre For Complementary Medicine Research involved 302 migraine sufferers. They were split into three groups; group A received traditional acupuncture on meridians, group B received sham acupuncture where the needles were not inserted on meridians, and group C was a control who received no treatment. The study found that both groups A and B had the same amount of pain reduction. This helps prove that acupuncture doesn't rely on meridians or qi to work.

# 2.1.2 – Astrology

In general, astrology is the belief that the movements of the planets and stars somehow affect entities on earth, be they people, pets, or even corporations. Because astrology lacks standards, there are many varying claims made about it. For example, the mechanism for how astrology allegedly works is often described to be as technical as quantum mechanics, as vague as claiming that all things are somehow connected, or as ignorant as not knowing. Likewise, the astrological ideals of each major culture are very different.

From its conception around 2000 BCE to the Scientific Revolution around 1600 CE, astrology and astronomy were regarded as the same thing. However, astronomy diverged into a science by adopting the scientific method, thereby comprising itself with falsifiable tests and predictions, while astrology remained mysticism by not testing itself and speaking in vague generalities.

## *Claims Regarding Mechanics*

**Claim:** Astrology is based on the cosmos and nature.
**Counter:** Astrology is entirely human-made and based on human concepts. The 12 Zodiac signs were created because the Egyptians used a base-12 counting system and broke up circles into 12 sections. The constellations

themselves are based off of the the imaginations of primitive people who played "connect the dots" in the stars and then related the results to human folklore. The signs and planets were given traits that humans associated with animals, gods, mythological figures, and the archaic concept of the classic four elements. It has nothing to do with nature.

**Claim:** Astrologers agree on astrology.
**Counter:** Western, Eastern, and Indian forms of astrology have major differences that conflict with each other. Which one is right, and how could you prove that one is right, while the others are wrong?

**Claim:** Your Zodiac sign matches up to the constellation you were born under.
**Counter:** This is true for sidereal astrology, used in Hindu astrology, but not in tropical astrology used by most Western astrologers.

At the time of the Zodiac's conception (circa 500 BCE) a person born on April 10th would be born under the constellation Aries. Meaning, if you were to check the constellation that was above the sunrise on April 10th, it would be Aries. However, the Earth doesn't perfectly turn on its axis, it has a wobble to it which causes the precession of the equinoxes. That means that constellations shift one degree to the east every 71.6 years, so about every 2,148 years the horizon shifts a full constellation.

Tropical astrology use March 20th as a guide which is close to, but no always on, the vernal equinox of the northern hemisphere. This means that birth signs of Western astrology have nothing to do with what constellation you were actually born under (especially if you live in the southern hemisphere).

**Claim:** Western astrology is based on the earth's relationship with the sun, and therefore begins its Zodiac signs on the vernal equinox.
**Counter:** This is sometimes true, depending on the year. Tropical / Western astrology begins with the sign of Aries on March 20th. However, March 20th is not always the vernal equinox. The actual vernal equinox changes from year-to-year because of the tilt of the earth. It can be as early as the 19th to as late as the 21st, but Western astrology doesn't account for this.

**Claim:** Gravity is the force that powers astrology.
**Counters:**

- Gravity is a very weak force that becomes even weaker as distances grow. The gravitational force of Earth on a 150 lb human is about 667 Newtons of force, but even that can't prevent us from easily jumping up in the air. Because it's so far away, the force of the planet of Mars on someone standing on Earth is about six ten-millionths (0.000 000 6) of a Newton. That amount is so incredibly small, that if you are standing next to a truck, the truck is exerting over ten times as much gravitational force as the entire planet of Mars. As you go towards the further planets the force gets even weaker.
- Even the force of gravity that the obstetrician who delivered you had more gravitational affect on you than the entire planet of Mars.

**Claim:** The force of the Sun and Moon's gravity can be seen in the tides of the ocean. Since humans are around 60-70% water, it makes sense that the Moon and Sun should affect our lives.
**Counters:**

- The change in tides are relative the the amount of water in an area. The oceans are an unbounded area (they're all the same body of water) which means that the water can easily move across the earth to affect the tides. Water in the human body is distributed in tiny bounded pockets throughout the body, so the tidal affect on them is completely undetectable.
- The amount of water in the oceans is what plays a big role on how far the tide moves. The oceans contain over 1,292,136,370,000 cubic meters of water, or about 341,000,000,000,000,000,000 gallons. That much water allows for ocean tides to raise and lower the sea level a few meters. The largest lakes in the world are much smaller and only have a tide of a few centimeters. The human body contains as much water as a puddle (about 34,100,000,000,000,000,000 times less than as the oceans).
- There are no studies showing that tidal forces have a measurable affect on humans, and even if studies did show a physical affect, that still wouldn't be proof that the tidal forces affect a person's future or personality.

**Claim:** Astrology is powered by the magnetic forces of the moon and planets.
**Counter:** Magnetic forces, just like gravitational forces, become weaker with distance to the point where the magnetic force of the planets is insignificant on Earth.

**Claim:** Astrology readings are based on your time of birth.
**Counters:**

- Why birth? Why not the time of conception, the third trimester, or when the mother's water breaks? Is there really such a change between moving a few inches outside of your mother's body that it will affect your future for the rest of your life?
- Is there some mysterious change that occurs during birth that obstetricians have yet to identify? Physically, not a whole lot changes when a baby is born compared to the day prior to its birth.
- What prevents a fetus in utero from being influenced by the stars and planets? Certainly not the flesh of the mother? If flesh prevented the effect of the stars, then all we would need to do is wear a suit of clothes made out of steaks and astrology would no longer have an effect on us.

**Claim:** It's important to know the time a person was born down to the minute in order to create the most accurate astrological chart.
**Counters:**

- What difference does the exact minute make when the position of the hospital in the timezone can alter that time considerably depending on its

location. Timezones aren't straight up and down either; many jut thought adjacent timezones which could alter the actual time well over an hour.
- Daylight Saving Time can throw off that time another full hour, especially in the small pockets that don't observe DST. The start and stop dates of DST have also changed over the years making a person's actual birth time even harder to pin down.
- Tropical astrology, used by most Western astrologers, uses March 20th, 01:00:00 for the vernal equinox, but the actual vernal equinox is usually many hours, sometimes more than a full day different than that.

**Claim:** The astrological influence of celestial bodies aren't affected by their distance.
**Counter:** All known forces of physics get weaker as their distance grows, yet in astrology, the influence of a star billions of lightyears away on the other side of the galaxy is just as strong as the influence of the Moon. If distance doesn't affect the influence of celestial bodies, why don't astrologers take into account the stars and planets from every single galaxy in the universe?

**Claim:** Your astrological sign will dictate certain physical features, like the shape of your face, the length of your fingers, etc.
**Counters:**
- Biologists have shown conclusively that physical features are dictated by your genes.
- No tests can ever concluded that physical features correlate to your birth date in a year.

**Claim:** A person's Zodiac sign affects their personality.
**Counter:** If this were true, everyone on Earth could easily be pegged into one of only 12 distinct personality types, but this is not the case.

## *Claims Regarding Accuracy*

**Claim:** It doesn't matter if astrologers can't explain exactly how astrology works, it still has accurate results.
**Counter:** All tests conducted on astrology performed in a proper fashion show that it is no more accurate than guessing; see below.

**Claim:** Horoscopes are accurate.
**Counters:**
- Statistician Michel Gauquelin sent the horoscope for one of the worst mass murderers in French history to 150 people and asked how well it fit them. The horoscope was so vaguely worded that 94% of the subjects said they recognized themselves in the description.
- See *Test 2.1.2 A* to test your own accuracy.

**Claim:** Astrological predictions are accurate.
**Counter:** Astronomers Rodge Culver and Philip Ianna examined 3,011 specific predictions by popular astrologers. They found that only 10% of their predictions actually occurred.

**Claim:** Because your astrological sign dictates what kind of personality you'll have, people tend to marry people with compatible signs.
**Counter:** In 1967 and 1968, Psychologist Bernard Silverman of Michigan State University compared the astrological signs of 2,978 couples getting married, and 478 couples getting divorced in the state of Michigan. Although astrologers claim that certain signs are more suited and certain signs are more incompatible, thus increasing or decreasing the chance of marriage and divorce respectively, he found no correlations between any of the signs and their marriage or divorce rates.

**Claim:** A person's sun sign determines which line of work they'll most likely choose.
**Counter:** Physicist John McGervey at Case Western Reserve University took the sun signs of around 6,000 politicians and 17,000 scientists to see if their sun signs clustered near any particular sign, but they were randomly distributed.

**Claim:** Astrology continually updates itself with the discovery of new solar objects like Vesta, Ceres, Juno, Chiron, etc.
**Counter:** Wouldn't this mean that all astrological predictions made before 1977 (the discovery year of Chiron) were inaccurate? What about the 1930 discovery of Pluto? When the next object in our solar system is discovered won't it prove that all previous astrological predictions were even less accurate?

**Claim:** People born at the same time will be affected by the stars in the same way.
**Counters:**

- *Twins Problem*—If this were true then all twins (fraternal and identical) would always lead identical lives. However, aside from often being dressed the same by their parents, twins are usually quite different from each other. Anyone who has been around a set of twins for a length of time will easily be able to tell the apart at a glance. The similarities that twins have are much better explained by their matched DNA and the environment they grew up in.
- *Time-Twins Problem*—When you compare the lives of multiple historical figures who were born on the same date you'll find that they led very different lives, yet astrology claims that they should have led nearly identical lives. In 2006, the psychology department of the University of Aarhus tested 15,000 time-twins and found no correlation between personality or intelligence.

**Claim:** Who cares if astrology works or doesn't? It's harmless fun.
**Counter:** If we assume that all of the evidence against astrology is proof that is wrong then all astrology really does is tell you how you should live your life. There are people all over the world who are addicted to astrology readings and waste thousands of dollars every year on it. They have grown dependent on having someone else tell them what to do, and in doing so, fail to make decisions for themselves or take responsibility for their own actions. Some people go as far as not associating with other people who were born in a specific month because they think they're incompatible with their sign. That form of prejudice is not a healthy way to live life.

*Test 2.1.2 A - Horoscope Accuracy*

Astrologers claim that horoscopes are accurate. You can easily test their accuracy with this test. Have someone copy down all twelve of the the day's horoscopes on a sheet of paper in a random order and remove any clues as to which sign the horoscope belongs. At the end of the day, take the sheet from them, and then have them leave the room. Read through each of the horoscopes and pick which one you think best describes your day. Then, return the sheet to the person helping you. Repeat this test for two weeks and at the end tally up the results. If horoscopes are accurate you should have picked your sign about 10-14 times in the two week span. However, if they're generic and apply to everyone then you'll probably only get about 0-4 correct.

# 2.1.3 - Cold Reading

Cold reading is a way to get information about someone else without directly asking them. It is employed by psychics, astrologers, mediums, mentalists, entertainers, con artists, salesmen, advertisers, etc. Sometimes the reader isn't even aware that they're using the technique. In general "cold reading" is a blanket term for all forms of gathering knowledge without direct questioning, but the different aspects of cold reading can be broken down into cold, warm, and hot reading.

## *Cold Reading*

Cold reading is the act of stating generalities and common factors of human behavior and then telling someone that those generalities apply to them personally. Cold reading is employed when no observable information is given to the reader. It is often used by astrologers and advertisers who must appeal to an unknown or unseen group of people. Because of this, cold reading is usually

vague, however, a good cold reader will present their reading in such a way that it seems specific.

An important aspect of cold reading is fishing. Fishing is the act of throwing out random names and topics and waiting for the subject to take the bait and give you information about themself. A good cold reader will be able to know when they have a hit by watching the changes in their subject's body language. Thus, even if the subject doesn't explicitly tell them they're on the right track, a good cold reader will know.

Cold reading seems to be more accurate than it is for several reasons. People tend to remember accurate information and dismiss inaccurate information. People will additionally try and force what is said into their lives in order to make the cold reader feel better. Also, people not only believe statements that are actually accurate to them, but also statements that they believe are accurate to them and statements that they wish were accurate to them.

## *Warm Reading*

Warm reading occurs when a manipulator uses observable information about a person to influence how they read that person. The way the person is dressed, their mannerisms, the way they talk, jewelry they may be wearing, and many other factors of a person's behavior can be utilized in warm reading. With a little observational skill, most people can become good at warm reading to the point where it seems paranormal, often even to the reader themself. Warm reading is the technique used most by psychics and diviners like palm readers, astrologers, tarot card readers, etc.

Warm reading seems very accurate for the same reasons as cold reading, but even more so because now the reader can be much more descriptive with what they say since they have a point to start from.

## *Hot Reading*

Hot reading goes beyond guesswork and assumptions about human behavior and uses the covert and furtive. Using subterfuge, a hot reader will actually get useful information before they make an attempt to read a person. This can be done by peaking into that person's wallet, having an accomplice relay information, listening in on conversations, searching for them on the Internet, and many other unethical ways.

Obviously, because hot reading gives the reader detailed information about their subject it yields very accurate readings. It also makes it much easier for someone to believe in the paranormal if they already wanted to because they have no logical explanation for how the information became known to the reader.

# 2.1.4 - Dowsing

Dowsing is an ancient form of divination, probably originally used to divine the will of the gods. Modern dowsing most likely originated from 15th century Germany where it was used to find metal. Since then it has been used for various reasons like finding hidden caches, water, gemstones, and even for things as unusual as testing the guilt of criminals. Each dowser offers a different explanation for how dowsing allegedly works. They usually claim that it has something to do with generic energies, magnetism, attraction, or various other methods that sound complicated, but are not at all scientific. A dowser usually uses an apparatus like a dowsing rod (often shaped like a Y or an L and made from various materials) or a pendulum (a crystal or metal bob on a cord), although some dowsers don't use any tools at all. For those that do, the apparatus usually moves in a particular way when it's divining what it's looking for.

While most dowsers seem genuine in their belief in dowsing, they don't realize that they are simply victims to the ideomotor effect (see *1.2.7 - Ideomotor Effect*) and a poor grasp of statistics. Self-deluded dowsers pick up tells from testers, have a keen eye for disturbed soil, and they tend to remember their hits over their misses.

Every properly-conducted double-blind test has shown that dowsers have the same accuracy as chance.

## *Claims*

**Claim:** Dowsers are very accurate.
**Counters:**

- A clinical test occurred in Germany in 2004. Several pipes were buried under a level field. Some had water going through them, some did not. 30 dowsers were asked which pipes had water running though. Each dowser agreed that the test was fair, each dowser was perfectly able to dowser for the correct pipe when they were told which one had water in it, each dowser expected to get them all right, but each dowser's accuracy was equivalent to guessing.
- A double-blind test was conducted by Chris French, professor of psychology at Goldsmiths. In his test there were 36 opaque trash cans, 6 with water, and the rest with sand. His subjects were asked to use their dowsing techniques to pick the six cans that had water. After they picked the six they wanted, he opened them all up. Out of several dowsers, their best guess only had 2 right; no better than chance.
- See *Test 2.1.4 A* to test yourself.

**Claim:** Dowsing works through magnetic fields, radiation, light waves, SONAR, RADAR, vibrations, the power of God, etc.

**Counter:** While a staggering amount of various claims are made by dowsers in regard to how they think it "works", no natural force has ever been measured to show a link between a dowser and the object they're dowsing for.

### *Test 2.1.4 A - Randomized, Double-Blind Dowsing*

The following test is designed to offer the dowser as much freedom as possible while also maintaining a proper randomized double-blind environment. The dowser will need their apparatus for dowsing and an object that they are sure they can successfully dowse for. You will need a tester, an impartial judge, six opaque containers (numbered 1 to 6), a six-sided die, two pieces of paper, and two pens.

In order to maintain a proper test it is important to follow protocol. Here is how the test will be conducted: Both the tester and the dowser leave the room. The judge enters the room and opens each of the containers. He then rolls the die and places the item to be dowsed under the corresponding container, closes each of them, and marks down on the paper which container holds the item. The judge leaves the room and calls for the tester and the dowser to enter. By keeping the judge and the tester separated you prevent the dowser from picking up on any inadvertent tells. Now the dowser is allowed to begin dowsing to guess which container has the item. Be sure that dowser does not touch the containers or try to look in them. The dowser is given unlimited time to make a decision. Once they've confirmed their answer, record the chosen container and both the dowser and the tester leave the room so that the judge may enter. This test must be performed five times to eliminate chance.

Before you being the real test, it is important to do five practice tests. A practice test follows the exact same procedure as a real test, only the judge tells the dowser which container has the item before they begin dowsing. Practice tests are very important. They let the dowser get comfortable with the testing procedure. They allow the dowser to make changes to the environment that can't be changed during the real test. They force the dowser to agree that everything is satisfactory and that they can successfully dowse in the environment. They also will help cut down on the amount of excuses the dowser will be able to give when they fail. It is important for the tester and the judge to be courteous and professional during both the practice tests and the real tests. This will minimize the "bad vibes" excuses.

Since the dowser won't know which container has the item they're looking for they are forced to guess on their results. The odds of getting one correct answer should happen about once every 6 times you conduct the test and getting two right, should occur once every 36 times you conduct the test. Neither is that uncommon. Three right—occurring about once every 216 tests—is rare, but it should happen once every 216 times you perform this test so it's still not that impressive. If the dowser gets four right (1 in 1,296) or five right (1 in 7,776), then there is a statistical significance.

# 2.1.5 – Ear Candling

Ear candling (AKA ear coning, auricular candling, thermal-auricular therapy) is an alternative therapy—allegedly used by any number of ancient cultures including the Hopi, Egyptian, Indian, and Chinese—that is used to remove earwax, yeast, and other unnamed toxins from a person's ear.

Ear candling begins with the patient lying on their side. The practitioner places a protective plate over the side of the patient's face to offer some protection from possible burning. The plate has a small hole in it, which is lined up with the opening to the ear canal. Then, an ear candle (a long hollow cone of cloth or paper, covered in hardened wax) is placed into the ear. The smaller end is placed in the ear canal and the wider end is held up vertically by the practitioner. The wide end of the candle is then lit on fire. It is assumed that, as the heat from the fire rises away from the candle, the air in the hollow candle is drawn out, generating negative pressure. This allegedly pulls earwax and other toxins out of the ear canal and up into the candle. After the candle burns down close to the ear the fire is extinguished and the candle is removed. The practitioner usually then shows the patient the remains of the candle, which contains a residue which resembles earwax.

## *Claims*

**Claim:** The heat from the fire draws out the air in the tube creating negative pressure to suck out unwanted earwax.
**Counters:**

- The Spokane Ear, Nose, and Throat Clinic of Washington concluded that no negative pressure is generated from ear candling.
- When burned in a transparent tube the same size and shape of the ear canal, you can witness smoke falling from the center of the candle into the artificial ear canal, showing, quite obviously, that there is no negative pressure.
- Even if the candle were somehow made airtight at the base of the ear, the larger hole at the top of the candle allows air in, preventing negative pressure from being generated.
- Even if negative pressure could be generated, the pressure from a tiny fire is nowhere near strong enough to remove cerumen (earwax) from the ear canal. Strong enough pressure would probably damage your eardrum long before it would pull out the cerumen.

**Claim:** You can tell ear candling works because of all the earwax that gets sucked into the end of the candle when it's used.
**Counters:**

- Viewing the ear canal with an otoscope before and after the procedure will show that nothing has been removed from the ear canal, although,

sometimes new residue from the candle is deposited.

- See *Test 2.1.5 A* to see how you can perform a test with a control group.

## *Test 2.1.5 A - Ear Candling With a Control*

While the waxy brown residue left behind at the end of an ear candle may appear to be earwax, performing a simple control test will prove it. Take two ear candles. Burn one of them as directed in someone's ear and burn the second without putting it in someone's ear. When you have finished, cut open both of the candle ends and compare them. You will have brown waxy residue in both of them. This shows that the the residue comes from the candle itself, not from removed earwax.

**Claim:** Ear candling is safe.
**Counters:**

- The Food and Drug Administration of the USA does not allow ear candles to be sold to "*diagnose, cure, treat, or prevent any disease*" because "*The product labeling is false and misleading in that there is no validated scientific evidence to support the efficacy of the product for its intended use.*" Instead, ear candles must be sold as novelties.
- A survey of 122 otolaryngologists (ear, nose, and throat doctors) revealed 21 cases of ear injuries resulting from ear candle use.
- An article written by doctors J. Rafferty, A. Tsikoudas, and B.C. Davis that was published in the December, 2007 issues of the *Canadian Family Physician* stated, "*Ear candling appears to be popular and is heavily advertised with claims that could seem scientific to lay people. However, its claimed mechanism of action has not been verified, no positive clinical effect has been reliably recorded, and it is associated with considerable risk. No evidence suggests that ear candling is an effective treatment for any condition. On this basis, we believe it can do more harm than good and we recommend that GPs discourage its use.*"
- Tests conducted by the Spokane Ear, Nose, and Throat Clinic of Washington have shown that, instead of removing cerumen (earwax) or candida (yeast) from the ear canal, melted wax from the ear candle was deposited into the ear canal during the process of ear candling.
- By simply burning an ear candle over a white nonflammable surface you'll see ash and soot left behind that would normally wind up in a person's ear.

**Claim:** Ear candling was originally performed by the Native American Hopi people.

**Counter:** The actual origin of ear candles is unknown, but is was certainly not the Hopi people, ear candle manufacturers fabricated that claim. Vanessa Charles, public relations officer for the Hopi Tribal Council, has stated that ear candling, "*is not, and has never been a practice conducted by the Hopi tribe or the Hopi people.*"

# 2.1.6 - Graphology

Graphology (or handwriting analysis) is the belief that a person's subconscious thoughts somehow manifest in their hand writing. Graphology is not the same as forensic document examiners who study handwriting as a means of checking for forgery or fraud. Graphologists believe that the way a person forms letters and the pressure they use is a gateway to their subconscious that can be used to determine physical and emotional characteristics about the writer.

## *Claims*

**Claim:** Graphology works because subconscious thoughts affect a person's writing.
**Counters:**

- No test has ever been conducted to support the idea that the subconscious mind is a reservoir of truth about a person.
- There is no evidence to support the idea that these truths are somehow manifested in a person's writing.

**Claim:** Graphologists have written various books which explain how writing can be attributed to personal traits.
**Counter:** Though there are several books on this topic, but the books do not agree with each other, nor do they cite properly conducted clinical tests in their favor. In fact, no formal theories have ever been created on how graphology could work.

**Claim:** A graphologist can accurately predict someone's personality traits based on their writing.
**Counters:**

- Tests performed by the British Columbia Civil Liberties Association have shown that the graphologists they tested were no better than chance at predicting personality traits in double-blind tests.
- A 1982 meta-analysis by D. Kahneman, P. Slovic, and A. Tversky of over 200 studies showed that graphologists were generally unable to predict any personality type of any specific kind.
- A 1987 test by Adrian Furnham and Barrie Gunter showed that graphologists are unable to predict the subject's scores of the Eysenck

personality questionnaire based on their handwriting.

- A 1988 test by R. Bayne and F. O'Neill showed that graphologists were unable to predict the subject's scores on the Myers-Briggs Type Indicator test based on their handwriting.
- A 1989 study by E. Neter and G. Ben-Shakhar showed that graphologists performed no better at predicting job performance than those not skilled in graphology.
- The British Psychological Society gives graphology a "zero validity" score at determining someone's character.

**Claim:** Graphology must work because it is employed at several companies throughout the world.
**Counter:** Even without any evidence to support it, graphology is utilized by hiring companies and admitting colleges. However, the actual numbers are difficult to obtain because many companies deny the use of such shady practices.

# 2.1.7 - Homeopathy

Homeopathy is the belief that harmful ingredients, when extremely diluted, can cure ailments in people. It was created by Samuel Hahnemann in 1807 as an alternative to the practices of bloodletting, purging, and drinking caustic chemicals (which were popular at the time). Hahnemann believed that all illnesses were caused by "miasms" (defined by homeopaths as a "*peculiar morbid derangement of vital force*") that entered the body when a person was in a negative state of mind—he dubbed this weakness the "law of susceptibility". These theories were invalidated later in the 1800s with the discovery of modern germ theory.

Hahnemann found that if you give the treatment of malaria (cinchona bark) to a healthy person, they will develop the same symptoms you would find in someone suffering from malaria. This led him to believe that all treatments must cause symptoms in a healthy person similar to those found in a sick person. He called this the "law of similars" (often referred to as "like cures like"). To find which chemicals to use as a treatment, he conducted what he called a "proving" by testing harmful chemicals on healthy people. If they produced symptoms similar to that of a sick person, he would use them for treatment. He did this in order to restore a supernatural balance of vital forces in the patient.

However, since Hahnemann noticed that his treatments would harm the patients further, he diluted the active ingredient in water by mixing one part ingredient to 99 parts water and vigorously shaking (he called it "succusing") the solution. One part of the solution was taken out and added to another 99 parts water. This process was repeated many times and although each result contained 100 times less (1C, or a centesimal) of the ingredient each repetition,

Hahnemann believed that the water was somehow vitalized with the ingredient in each succussion. He called the process of dilution "Dynamization" or "potentization" and Hahnemann believed that the more dilute a solution becomes, the stronger it becomes. Hahnemann advocated a 30C dilution of the ingredient, or one part ingredient in $10^{60}$ parts water. He didn't know it at the time, but dilutions over 12C surpass the Avogadro constant which states that there may not even be a single molecule of the ingredient in the solution.

Hahnemann continued to advocate his tinctures because he had no understanding of modern germ theory, modern chemistry, clinical trials, or the placebo effect. All of these well-tested and well-understood scientific principals now show that homeopathy doesn't work.

While Hahnemann added 1 parts ingredient to 99 parts water, most modern homeopaths have devised their own scales and dilute at different levels. The more common seen scales are in *Table 2.1.7 A*.

*Table 2.1.7 A - Homeopathic Dilution Scales*

| Symbol | Ratio | Notes |
|---|---|---|
| X | 1:10 | X is the Roman Numeral for 10. |
| D | 1:10 | D stands for decimal. |
| C | 1:100 | C is the Roman Numeral for 100. |
| M | 1:1,000 | M is the Roman Numeral for 1,000. |
| Q | 1:50,000 | Q stands for quintamillesimal or a 50,000th. |
| LM | 1:50,000 | L for the Roman Numeral 50, M for 1,000. |

## *Claims*

**Claim:** Homeopathy is a very old treatment.
**Counters:**

- Homeopathy is so old that it was created before the medical community knew about bacteria, viruses, protozoa, or the placebo effect. It was created during a time when everyone still believed that sickness was caused by having your soul misaligned.
- Homeopathy was created long before doctors performed clinical trials involving control groups or placebos which we now know are mandatory in order to prove that a treatment works.

**Claim:** Homeopathy has many satisfied customers.

**Counters:**

- Every test ever conducted with placebos has had satisfied customers as well. Satisfied customers don't prove that homeopathy works.
- Homeopathic practitioners tend to spend considerably more time talking and listening to their patients. This gives them a greater sense of comfort and understanding which is a large factor in overall customer satisfaction.
- Most human afflictions go away on their own without treatment. Without proper testing and controls you can't know if homeopathy works.

**Claim:** Homeopathy can treat any disease
**Counter:** When homeopathy was created, doctors didn't even understand how diseases worked. They had little or no knowledge of bacteria, protozoa, viruses, and micro fungi, and therefore had no idea how to treat it. Homeopathy's creator claimed that people became sick due to having their vital force out of alignment that occurred when they were in a negative state of mind. Modern homeopaths still believe this, even with stark contradictory evidence.

**Claim:** Samuel Hahnemann rejected the ideas of bloodletting and purging as treatment and instead claimed that proper diet, exercise, and cleanliness are important.
**Counter:** Although he wasn't the first to suggest such things, Hahnemann's ideas of diet, exercise, and cleanliness should indeed be applauded. However, his other ideas are all baseless and useless to the medical community. These ideas include:

- *Vitalism*—The belief that illness is caused by a person's energy or soul being out of balance.
- *Miasm*—A generic intangible illness that causes all diseases.
- *Law of susceptibility*—The belief that people are susceptible to miasms when they're in a negative state of mind.
- *Law of similars*—The idea that illnesses are cured by chemicals that make healthy people sick with similar symptoms of the illness.
- *Proving*—Using harmful chemicals on healthy people and documenting their effect so they can be used on sick people.
- *Succussion*—Violently shaking up water to mix it with the vitality of the ingredient.
- *Dynamization, Trituration, Potentization*—The belief that water or powder can hold a charge or memory from whatever is succussed in it.

**Claim:** Homeopathy has been proven effective.
**Counters:** Many tests of homeopathy have been conducted. Some poorly conducted tests showed that homeopathic tinctures are were slightly more effective than a placebo, but all tests that were conducted in rigorously controlled double-blind clinical settings show that homeopathy is no more effective than a placebo. Here are some examples:

- In 1988, Jacques Benveniste's homeopathic remedies were showing

positive results until it was revealed that none of his tests used a double-blind control. When a double-blind control was used, all of his tests failed to produce positive results.

- A 2001 randomized, double-blind, and placebo controlled test of a homeopathic allergy remedy was used at a test in Hampshire and Dorset. The homeopathic remedy preformed equal to a placebo.
- A 2003 test published in the British Journal of Clinical Pharmacology was conducted with a 30C belladonna tincture. The test was performed by the Complementary Medicine Research Unit, of the University of Southampton, UK. With a randomized, double-blind, and placebo controlled test, no observable clinical effects of the tincture could be shown.
- In 2008, 20/20 covered a test of a homeopathic allergy remedy on 400 samples at Guy's Hospital in London. Three homeopaths oversaw the dilution process and the university's scientists reviewed the test and declared it "technically sound" and "meticulously conducted." At the end of the test, it was declared that the homeopathic remedy was no more effective than water.

**Claim:** Homeopathy is accepted by the medical community.
**Counter:** Health organizations like the UK's National Health Service (NHS), the American Medical Association (AMA), and the Federation of American Societies for Experimental Biology have all issued statements saying that homeopathy has not been proven effective.

**Claim:** Homeopathy has no side effects.
**Counter:** That is because homeopathic tinctures are 100% water or inert ingredients that don't contain any ingredients at all. If it did have active ingredients, then side effects would be as common as the side effects of all effective medication.

**Claim:** The dilution amount isn't that much.
**Counter:** *Table 2.1.7 B* shows the extreme levels of dilution used in homeopathy. Assume that one drop of the original ingredient is added to the container.

**Claim:** Homeopathic ingredients are all natural.
**Counter:** That depends on how you define "natural". Some of the more common homeopathic remedies start with graphite, silver nitrate, picric acid, mercury, crude oil, arsenic, snake venom, and anthrax before the dilution process begins. These ingredients would most likely not be listed as "natural" in food.

*Table 2.1.7 B - Homeopath Dilution Levels*

| X/D Scale | C Scale | Medicine to Water Ratio | Size of Container Needed to Hold the Mixture | Notes |
|---|---|---|---|---|
| 1X | - | 1:10 | An eye dropper | Homeopaths describe this as low potency |
| 2X | 1C | 1:100 | A glass of water | |
| 4X | 2C | 1:10,000 | A bucket | |
| 8X | 4C | $1:10^{8}$ | A swimming pool | Safe level of arsenic in drinking water |
| 12X | 6C | $1:10^{10}$ | A large lake | |
| 24X | 12C | $1:10^{20}$ | The Atlantic Ocean | Past the Avogadro constant; solution probably doesn't have a single molecule of medicine |
| 60X | 30C | $1:10^{60}$ | A very large galaxy | Suggested amount of dilution by Samuel Hahnemann |
| 400X | 200C | $1:10^{400}$ | Larger than the observable universe | Dilution in many homeopathic flu tinctures |

**Claim:** Homeopathic medicine still contains a small amount of the original ingredient.
**Counter:** This depends on how much the ingredient is diluted. At a dilution level of 8X/4C, even powerful poisons are rendered harmless, yet homeopaths claim that their medicine somehow becomes more powerful. At a dilution level of 24X/12C you probably don't even have a single molecule of the original ingredient in the solution because you passed the Avogadro constant. If you consumed an entire Olympic-sized swimming pool full of a solution at 30X/15C dilution, you'd still only have a 63% chance of drinking a single molecule of the original ingredient. Once you get to the dilution amount that the creator of homeopathy suggested, 60X/30C, the chance of having a single molecule of the original ingredient is $10^{36}$ or a billion billion billion million thousand to 1 chance.

**Claim:** Water holds a charge, memory, or vibration of whatever ingredient was added to it, even after the ingredient is no longer present.
**Counters:**

- There is no law of chemistry or physics that explains such a property and to no peer-reviewed tests to make this statement valid. No scientist has ever found a property of water, or any other substance, that carries a charge, memory, or vibration.

- No homeopath or scientist has ever show the ability to discern the difference between ordinary water and "charged" water. They are chemically indistinguishable.
- If this were true, all drinking water on the planet should be toxic because all water on the planet has at some point gone through digestive tracts, septic tanks, waste treatment, or contained various forms of poison or radiation. Why don't the charges from these conditions affect us?

**Claim:** Homeopathy can't be tested clinically because it must be hand-tailored to each individual.
**Counters:**

- Clinical trials can be customized to match any real-world individual needs.
- What makes homeopathy so special that it can't work for many people the same way that effective drugs like aspirin and ibuprofen do?
- Having to claim that a drug is so special that it only affects specific people in a specific way with a specific mindset is a good indicator that it doesn't work.

**Claim:** Homeopathy is proven to work because cinchona bark, a treatment for malaria, causes malaria-like symptoms in healthy people.
**Counters:** Out of the thousands of ingredients that homeopaths use in their tinctures, very few have been shown to heal anything at all, and only then they only heal in regular (undiluted) doses. One such ingredient are the alkaloids found in cinchona bark that have side effects similar to malaria. However, try taking normal dosages of other homeopathic ingredients and see what happens; caffeine for insomnia, onions for eye irritation, arsenic for a cold, graphite for eczema, or poison ivy for joint pain.

**Claim:** Homeopathy works due to the Arndt-Schulz rule which states that, "*For every substance, small doses stimulate, moderate doses inhibit, large doses kill.*"
**Counters:**

- The Arndt-Schulz rule was first stated in 1888 even before the discovery of penicillin. Modern doctors don't use it because it is arbitrary, inaccurate, and dangerous.
- The sizes used, "small, moderate, and large," are arbitrary. For example, you would have to drink gallons of water before it killed you, but ricin can kill you with less than 5 grams (the weight of a nickel).
- Even if this rule were correct, it still doesn't support homeopathy because homeopathy doesn't have any of the ingredient at all.

**Claim:** Homeopathy is a good alternative to expensive drugs.
**Counter:** Homeopathic drugs are also expensive. However, unlike real drugs, they do nothing to treat disease, thus the money is wasted. Although many diseases will heal on their own, other diseases will get worse because homeopathic treatments are ineffective.

# 2.1.8 – Lie Detection

Lie detection is the attempt to determine whether someone is lying. Attempts at lie detection have existed for thousands of years and in many different forms including devices, supernatural powers, psychology, etc. The only thing each form has in common is that they're all ineffective.

## *Claims*

**Claim:** The lie detectors used by the FBI, CIA, etc., are effective.
**Counters:**

- Polygraph machines measure many attributes of a person including blood pressure, heart rate, respiration rate, body temperature, skin conductivity, stress in the voice, etc. The idea is that when a person tells a lie, their body reacts in a predictable way. However, many things can affect any of those factors including: excitement, fear, illness, needing to use the bathroom, etc. Also, many people react differently when they lie, and some people don't react at all. In the end, all this data must be interpreted by a person who must make an educated guess as to whether the subject is lying. Polygraph machines have never been proven effective.
- The polygraph has been successfully beaten by several spies: Aldrich Ames, Karl Koecher, Ana Belen Montes, and Leandro Aragoncillo, but it has never been successfully used to discovered a spy.
- A 1997 survey of 421 psychologists estimated that polygraphs are only 61% accurate.
- In the 1998 case of United States v. Scheffer, Scheffer passed the polygraph test about whether he recently used drugs, but his urine tested positive for methamphetamine, proving that he had used drugs, and that he beat the polygraph.
- In 2001, William G. Iacono, a Professor at the University of Minnesota concluded that, "*Although the control question test [of polygraphs] may be useful as an investigative aid and tool to induce confessions, it does not pass muster as a scientifically credible test. CQT theory is based on naïve, implausible assumptions.*"
- Michael Shermer, who had never taken a polygraph before, was quickly trained to successfully tell a lie and have it appear as a truth on a polygraph.

**Claim:** Lie detectors that directly monitor the brain are effective.
**Counter:** fMRIs and other EEG machines have been proven many times to be ineffective at measuring whether a person is lying or not. Episode 109 of *Mythbusters* shows that even an untrained person can beat a fMRI lie detector.

**Claim:** Truth serums are effective at getting information from people.
**Counter:** Drugs like sodium thiopental (Sodium Pentothal), temazepam, and ethanol may be effective at making people more loquacious, but what is said in these drug induced stupors is very unreliable according to an article of Dr. August Piper Jr., M.D., published in the *Journal of Psychiatry & Law* and the book *The Howdunit of Poisons* by Anne Bannon and Serita Deborah Stevens.

**Claim:** Lie detectors in the form of pendulums work.
**Counter:** Using a pendulum as a lie detector is a combination of the operator using warm reading (see *2.1.3 - Cold Reading*) techniques on the subject and the ideomotor effect (see *1.2.7 - Ideomotor Effect*) swinging the pendulum and are therefore ineffective.

# 2.1.9 – Manipulation Techniques

There are many methods of manipulation that people can use to get what they want. Some are very subtle, others are forceful, but the end the result is the same—a person manipulates their subject to get what they want.

Manipulation techniques work much better when a person isn't expecting them or has never experienced them. As a manipulator's subject becomes more familiar with the manipulator's techniques, it becomes easier to see the manipulation for what it actually is.

## *Flattery*

Flattery is a very basic and very simple principal—people tend to like those who give them compliments and make them feel better about themselves. By cozying up to another person and indulging their self-centeredness, it becomes much easier to manipulate that person. Be aware that not everyone who compliments you is doing so genuinely.

## *Intimidation*

Very different from flattery is intimidation. Instead of catering to a person's self-worth, a manipulator will instill fear into them. The fear is usually in the form of harm—be it physical, emotional, financial, etc. Because intimidation makes the subject afraid of the manipulator, it can be employed when a weakness is detected by the manipulator. If the manipulator needs to worry about retaliation, intimidation is usually saved as a last resort. Intimidation is used often by lawyers, law enforcement, faith healers, and con artists. Think

about their threats carefully. Can they really do what they claim? Will they really do it?

### *Suggestion*

Suggestion is a method where a manipulator will guide their subject's behavior by trying to convince them that they want what the manipulator tells them they want. Manipulators who use suggestion are usually very confidant because people tend to follow suggestions more when they come from a confident person. Suggestion is used heavily by hypnotists and salespeople. Make sure that they're not putting ideas in your head by knowing from the start what you want.

### *False Modesty*

Another technique to use in manipulation is to pretend you're bad at what you do. Many psychics, mediums, and salespeople will claim that they're not very good at what they do or that they're just a simple person trying to make it in the world. This is done prior to performing so that their subjects will judge them with lower standards. The lower the subject's standards the more they'll try to help the manipulator along by giving them useful information and forgetting inaccuracies so they'll be more impressed in the end.

## 2.1.10 - Orbs

Orbs are balls of light that appear in photographs. While some people believe that orbs are supernatural—either from magic, spirits, or even inter-dimensional travelers—there is a much more mundane explanation to them. Orbs are merely light reflected back into the camera lens either from various reflective material like dust, rain, snow, pollen, small pieces of glass, metal, or from other light sources that are present when a picture is taken. Photographers call this backscatter. Backscatter is more prevalent in smaller cameras (the kind most amateur photographers possess) because the flash bulb is closer to the lens. This increases the amount of reflected light from the flash, to the subject, and back into the lens.

### *Claims*

**Claim:** Orbs cannot be caused by dust/reflective material/other light sources because they don't appear to be.

**Counter:** Most people are not familiar with how cameras work and why backscatter looks the way it does. Reflected light from a small source that is out of focus will always show up as a ball of light. You can easily recreate orbs by taking pictures in a dark dusty environment or at night in the rain. Also, if you use ambient lighting instead of flash bulbs, the frequency of backscatter will drop considerably.

**Claim:** How can you explain that orbs show up more at night, or in places like graveyards and basements?
**Counter:** Because orbs are nothing more than reflected light, it stands to reason that when a picture is taken in low light or darkness they are more prevalent because the only light source comes from the camera's flash. Also, places like basements, caves, etc., have more dust, and therefore, more chance of reflection.

**Claim:** How do you explain orbs that appear to be in motion or have a purple fringe around them when nothing in the area is purple?
**Counter:** The orbs appear to be in motion because the thing that's causes them (dust, rain, snow, etc.) is also in motion. This is a standard motion blur that occurs when you photograph something that is moving. The purple fringe, and various other chromatic aberrations, occur in lower quality cameras because the lenses aren't picking up light properly. They usually look purple because the wavelengths of light are increased in hertz so they are shifted to the violet edge of the visible light spectrum.

# 2.1.11 - Ouija Boards

Ouija (pronounced "wee-jah") boards are used to allegedly communicate with spirits. They are the product of the Modern Spiritualist Movement in the United States and were first manufactured in the late 1800s. Some users claim that they existed thousands of years ago in the form of Chinese fuji writing or the Greek philosopher Pythagoras, but there is no credible evidence to support these claims.

A Ouija board consists of a thin board that is covered with letters, numbers, and phrases and a smaller, triangular board with a hole in it called a planchette (French for "little plank"). Ouija boards are said to work through the power of spirits. All the operators of the board put their hands on the planchette and ask the spirits a question. The spirits supposedly guide the operator's hands so that they move the planchette around the board and stop at individual letters or numbers. The letters eventually spell out the answer to the question.

## *Claims*

**Claim:** The planchette is guided by the power of the spirits.
**Counter:** The planchette is moved either by a person consciously doing so (i.e., cheating), or subconsciously doing so (i.e., the ideomotor effect). Cheating is easy to explain, but the ideomotor effect (see *1.2.7 - Ideomotor Effect*) is caused when the operator subconsciously moves the planchette to spell the word they're consciously or subconsciously thinking of. It's easy to think that planchette is being powered by spirits when you're unaware of the ideomotor effect, especially when your subconscious answer is different from your conscious answer. The people operating the board are doing all of the movement and one obvious way to prove this is by noting that the "spirits" will misspell words the same way that the operators misspell words.

**Claim:** It can't be the ideomotor effect because even a user who is blindfolded can spell out words.
**Counter:** It doesn't take long to memorize the board's layout to the point where you can operate it blindfolded. However, tests have been conducted that show when the operators are blindfolded, and the board is turn 180° vertically without their knowledge, they still move the planchette to where they think the letters are, when in fact, they're spelling out gibberish. If the planchette was guided by a spirit it should correct for the upside down board.

**Claim:** Operators shouldn't be blindfolded because the spirits have to use the eyes of the operators to help guide the planchette.
**Counter:** Throughout the history of the Ouija board there is no mention of spirits needing to use the eyes of the operators. This is an *ad hoc* claim that was added after the operators failed the skeptic's blindfolded tests. How is it that a spirit can know the answers to all sorts of strange and difficult questions about our world if they can't even see anything in our world?

# 2.1.12 – Pendulums

A pendulum is a simple device composed of a weighted bob on a cord. If the bob is moved it will swing back and forth on the cord while gravity and friction cause it to slow down and eventually stop. The pendulum has been used for scientific purposes for thousands of years, but it is also used by many self-proclaimed mystics for a myriad of unscientific uses including dowsing, lie detection, divination, and many more.

Pendulum users cannot agree on what pendulums should be made of, how they work, or why they work. However, most skeptics believe that the swing of a pendulum is caused by the ideomotor effect. The common practice of pendulum users is to ask the pendulum a yes-or-no question, and then, depending on how the pendulum swings, interpret their answer. This seems to yield a high success rate since the operator will automatically get every question that they already know the answer to correct. Of the questions they

don't know the answer to, they can usually make an educated guess, so they perceive a total accuracy above 75% without any "special powers". Combine this with confirmation bias and subjective validation and pendulums seem very accurate.

## *Claims*

**Claim:** Pendulums are effective for gaining personal insight.
**Counter:** Since pendulums work because of the ideomotor effect (see *1.2.7 - Ideomotor Effect*), they are only telling you what you already know about yourself.

**Claim:** Pendulums are effective for dowsing.
**Counter:** Pendulums are just as ineffective as all other dowsing tools (see *2.1.4 - Dowsing*).

**Claim:** Pendulums are effective for lie detection.
**Counter:** Pendulums are even less effective than polygraphs and many other lie detection tools (see *2.1.8 - Lie Detection*).

**Claim:** Pendulums are effective for divining the unknown.
**Counter:** You can test the accuracy of pendulum divination with *Test 2.1.12 A*.

### *Test 2.1.12 A - Pendulum Divination*

Here is a simple double-blind test that anyone can perform themselves. You'll need a standard six-sided die, an opaque ceramic mug, a notepad, and a pencil.

1. Put the die in the mug and shake it up. Turn the mug over and place it upside down on the table with the die inside of it. Make sure you can't see the roll.
2. Ask your pendulum if the roll is a 1 and record the result. Then, ask if the roll is a 2, then a 3, 4, 5, and 6. Only one of the numbers should get a "yes" response from the pendulum. Now turn the cup over and record if you were right or wrong.
3. Always do the test a total of five times to ensure that randomness doesn't play a factor.
4. When you've finished, tally up the results. If you have 2, 1, or 0 correct, then you did about what you would expect from random guessing. If you have 4 or 5 correct, you may have paranormal powers, so repeat this test several more times to be sure.

# 2.1.13 - Perpetual Motion

Perpetual Motion is the idea that motion can be maintained indefinitely in the form of a machine. Throughout history many people have theorized such a machine, and many have tried to build one. However, so far, nobody has ever had any success building one. Furthermore, and all forms of perpetual motion would violate the first or second laws of thermodynamics.

## *Claims*

**Claim:** Perpetual motion is possible.
**Counter:** If perpetual motion were possible it would require a machine that either has no friction, creates new energy, or perfectly converts existing energy. However, friction always exists in anything that moves, creating new energy violates the the first law of thermodynamics, and a perfect conversion of energy violates Kelvin's statement in the second law of thermodynamics.

**Claim:** A perpetual motion machine was proposed by a famous scientist, therefore it is possible.
**Counter:** Even famous scientists make mistakes. Many great scientists in history have proposed perpetual motion devices, however most of them did so prior to all the evidence to support the laws of thermodynamics. All recent perpetual motion device proposals are the product of under qualified, and often delusional, persons.

**Claim:** I know someone who has a perpetual motion machine.
**Counter:** Once he submits the machine to testing by qualified engineers you'll find that, though the machine may be highly efficient, it is certainly not capable of perpetual motion.

# 2.1.14 - Soul

Many different religions and beliefs systems include a soul. Most view the soul as something beyond the physical aspects of a person's body, like the very essence of who a person is.

In Christianity, Islam, and Judaism the soul is the immortal divine part of a human that will exist after a person dies and go on to be with their god. In Hinduism and Buddhism, there is a soul in all living organisms that is reborn into a new creature each time the body dies.

The underlying theme with a soul is that it's immortal, and that it's anchored to a person's body while they're alive, but is not bound to the host body so it leaves when the body dies. According to some, a soul can be used as

a tool of various sorts either for communication, astral projection, healing, etc. Regardless, there is no scientific evidence to support the existence of a soul.

### *Claims*

**Claim:** According to a scientific test, the loss of the soul at time of death shows that the soul weighs 21 grams.
**Counter:** This claim was made by Dr. Duncan MacDougall in 1907. He placed dieing patents on a bed attached to a scale and measured their weight as they died. There are several problems with his tests.

- He only performed six tests and the results varied for each test. Two of the tests were botched, and the other four all had varying fluctuations in weight at death—one even resulted in an increase in weight.
- The oft quoted measurement of 21 grams occurred in only one test. Other tests had different amounts.
- The test failed to establish an explanation of how the small loss of weight at time of death must be a soul escaping from the body and not more reasonable explanations like evaporation of bodily fluids, exhalation of air from the lungs, or inaccurate scales.
- The test failed to accurately ascertain exactly when the patient died in order to properly measure the patient's weight before and after death.

# 2.1.15 - Subliminal Messages

Subliminal messages are named because they are messages that you don't consciously perceive, but may notice at a subconscious level. Examples of this include words or images that appear for extremely short periods of time in movies and phrases in music that are backward or impossible to understand. It is important to note that if a message is consciously perceived it does not qualify as subliminal.

One popular form of subliminal message is called backmasking. Backmasking is so named because it is believed that a hidden message is masked by recording audio backwards so that the listener can't make out what is heard. Backmasking stirred up a lot of controversy over the years especially in rock music. It was first popularized on the 1966 Beatles' album *Revolver* And even more from the "Paul Is Dead" message that some claim can be heard on *The Beatles* [The White Album]. Several other artists were alleged to use backmasking including Electric Light Orchestra, Pink Floyd, Queen, and Styx.

## *Claims*

**Claim:** Subliminal messages hidden in film or music can affect your subconscious.
**Counter:** To date, no repeated peer-reviewed clinical test has ever been shown to affect the subconscious or brain in any way.

**Claim:** A test was conducted at a movie theater where words like "popcorn" and "Coke" were flashed on the screen, and people bought more popcorn and Coke than usual.
**Counter:** This claim was made in the book *The Hidden Persuaders* by Vance Packard, but it was later revealed that the results were fabricated. James Vicary flashed subliminal messages during the showing of the movie *Picnic* at a theater in New Jersey. Vicary used a tachistoscope to project the words, "Drink Coca-Cola," and, "Hungy? Eat Popcorn," for 1/3000th of a second at five-second intervals during the movie. Vicary claimed a 57.8% increase of popcorn sales and an 18.1% increase of Coke sales during the test. Once Packard's book was published, there was a public outcry about the possibility of abuse in subliminal messages. However, as copies of this test failed to produce similar results, Vicary finally admitted, in 1962, that he made up his results.

**Claim:** A test was conducted where the words "telephone now" were put in a TV show and there was a huge rise in phone calls after the show.
**Counter:** This was another test by James Vicary. In 1958, he flashed the words, "telephone now," during a program on Canadian Broadcast Corporation. However, no rise in phone calls were actually measured.

**Claim:** The FCC banned subliminal messages, which proves they affect people.
**Counter:** The Federal Communications Commission banned subliminal messages in 1974 as a response to public outcry and fear from the fraudulent tests of James Vicary, not because any evidence shows they to work. The FCC stated that subliminal messages are "*contrary to the public interest*" and "*intended to be deceptive*", but they never claimed that they work.

**Claim:** Backmasking is an effective way to hide subliminal messages in music.
**Counter:** The following studies show that backmasking doesn't work:

- D. Averill's 1982 study found no links to behavior and backmasked messages in audio.
- In 1985, psychologists John Vokey and J. Don Read conducted a study using backmasked bible verses, pop music, and commercial messages. Participants had trouble noticing backmasked phrases when the samples were played forwards, were unable to judge the types of messages (Christian, Satanic, or commercial), and were not led to behave in a certain way as a result of being exposed to the backmasked phrases. Vokey concluded that "*we could find no effect of the meaning of*

*engineered, backward messages on listeners' behavior, either consciously or unconsciously.*"

- T.E. Moore's 1988 experiment found "*no evidence that listeners were influenced, consciously or unconsciously, by the content of the backward messages.*"
- Psychology professor Mark D. Allen's 1992 experiment found that exposure to backward messages did not lead to significant changes in attitude. He remarked that, "*delivering subliminal messages via backward masking is totally and ridiculously impossible.*"

**Claim:** AC/DC's album *Highway to Hell* was responsible for serial killer Richard Ramirez.
**Counter:** Richard Ramirez tried to blame AC/DC for his murders and took the band to court in 1988, but lost. AC/DC's Angus Young responded that "*You didn't need to play [the album] backwards, because we never hid [the messages]. We'd call an album Highway To Hell, there it was right in front of them.*"

**Claim:** Judas Priest's album *Stained Class* caused a boy to kill himself.
**Counter:** Judas Priest was accused of being the cause of a suicide pact of two Nevada schoolboys. The matter was brought to trial in 1990 and the prosecutors claimed that their music contained the subliminal phrase "do it" which made the boys want to kill themselves. The case was dismissed by Judge Jerry Carr Whitehead for insufficient evidence of Judas Priest's placement of subliminal messages on the album. The judge's ruling stated that, "*The scientific research presented does not establish that subliminal stimuli, even if perceived, may precipitate conduct of this magnitude. There exist other factors which explain the conduct of the deceased independent of the subliminal stimuli.*" Judas Priest members commented that if they wanted to insert subliminal commands in their music, messages leading to the deaths of their fans would be counterproductive, and they would prefer to insert the command, "Buy more of our records."

**Claim:** You can buy New Age music with subliminal messages added in that claim to make you feel better/smarter/more relaxed, etc.
**Counter:** This music has not been clinically tested to prove its effectiveness. And since every test has shown subliminal messages to be ineffective, if they were tested they would most likely be shown ineffective.

**Claim:** Many religious leaders claim that subliminal messages are effective, so they must be harmful. Here are some examples:

- Pastor Gary Greenwald claimed that subliminal messages backmasked into rock music induce listeners to sex and drug use.
- Christian DJ Michael Mills argued in 1981 that "*the subconscious mind is being successfully affected by the repetition of beat and lyrics—being affected through a subliminal message.*" Mills has toured the country warning Christian parents about subliminal messages in rock music.

- Minister Jacob Aranza wrote in his 1982 book *Backward Masking Unmasked* that rock groups "*are using backmasking to convey satanic and drug related messages to the subconscious.*"

**Counter:** Though religious leaders may be respected members of the community, they are rarely qualified psychologists who can make valid claims as to the effectiveness of subliminal messages. However, many qualified psychologists have performed tests that show that subliminal messages are innocuous.

# 3.0 - Religion

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Religions are sets of beliefs held by groups of people involving spirituality and faith. Most religions believe in some form of supernatural force that regulates the universe. Most religions also believe in some form of a soul (see *2.1.14 - Soul*).

## *Claims*

**Claim:** You can't have morals without religion.
**Counters:**

- Many scientists have shown that morals are partially derived from our genetics. (Darwin 1871, Hamilton 1964, Grafen 1985, Sober and Wilson 1998, Frank 1998, Boyd and McIlreath 2006)
- Morals are defined by culture. The morals of every culture, regardless of the dominant religion of the culture, change over time even if the religion does not. The USA once permitted slavery and treating woman like property, as written in many religious scriptures. However, as the culture of most countries changed to abolish slavery and grant women equal rights, so to did the morality of the country. Even though the bible still states that slavery and treating women as property is acceptable, most religions have instead adopted the morals of their culture.
- The ratio of Christian US citizens to Christian US prison inmates is almost 100 times greater than that of non-religious citizens, showing that

Christians are more likely to be found in prison. See *Table 4.1.2 B*.

- Religious people are more likely to get divorced than non-religious people. See *Table 4.1.2 A*.

**Claim:** My religion is the one true religion.
**Counter:** Most religions claim that their's is the one true religion, yet none of them offer any evidence to prove why there's is more true than any other religion.

**Claim:** My religion is the largest, and therefore correct.
**Counter:** No matter what religion you believe in, if you tally up the other religions, most of the world disagrees with you. See *Table 3.0 A*.

*Table 3.0 A - Top Ten Religions By Percent*

| Religion | % World Wide |
|---|---|
| Christian | 33.06% |
| Muslim | 20.28% |
| Non-religious | 14.27% |
| Hindu | 13.33% |
| Chinese Universalist | 6.27% |
| Buddhist | 5.87% |
| Ethnoreligious | 1.68% |
| Sikh | 0.39% |
| Jewish | 0.23% |
| Spiritist | 0.20% |

Encyclopedia Britannica, 2005

**Claim:** My god(s) exists because my scripture says they do, and I know that my scripture is true because it was created by my god(s).
**Counter:** This is a flaw in logic called circular reasoning. You can't validate a statement by using itself as proof. Some form of objective proof must be added to break the cycle.

**Claim:** Science answers the how, but religion answers the why.
**Counter:** Science answer both the how and why, and religion does a poor job of answering the why. For example: why is the sky blue, why is there gravity, why does light appear to act like both a particle and a wave? Religion doesn't answer any of these whys, it only creates more by offering generalized answers

designed to make people feel better like: “You are loved”, “we’re all brothers”, “your dearly departed are in a better place”, “the gods work in mysterious ways”, etc.

**Claim:** Science is based on faith just like religion.
**Counter:** Science is not at all like religion. Science uses axioms like “inductive reasoning is sound” and “our five senses give us accurate information” which most would regard as self-evident, not faith. From there, science uses evidence to formulate its theories. Even then, science always concedes that it may be wrong and continues to test its theories over and over again. Religions, on the other hand, make very staggering claims, often contrary to physical evidence, and believe that they can never be wrong.

**Claim:** Religion must be true because many people that have died and been resuscitated have had religious experiences involving angels, tunnels, white lights, Jesus, etc.
**Counters:**

- Brain activity during near-death and actual death has been well-studied by scientists and hallucinations have been found to be quite common.
- People always see visions based on the religion that they believe at the time. Christians see Jesus, Hindus see Brahman, Muslims see Mohammad, etc. Does this mean that all religious figures exist in the afterlife? Does it mean that everyone was hallucinating except for people who saw what you agree with? It seems more likely that the secular explanation of hallucinations is the correct answer.

# 3.1 - Christianity

Christianity is a monotheistic religion centered on the teachings of Jesus of Nazareth as dictated in the New Testament of the Christian bible. It is the largest religion in the world including the major denominations of Catholicism, Protestantism, Orthodoxy, and various other non-Trinitarian denominations.

Although the various sects of Christianity believe in different interpretations of the ideals of Christianity, the primary tenants are as follows:

- There is only one true god, and that is the god of Moses and Abraham, named “God”.
- God created the universe and everything in it, including humans.
- God is composed of three separate parts called Trinity. Trinity is composed of the Father (God), the Son (Jesus), and the Holy Ghost (Spirit).
- Adam and Eve sinned against God and he cursed all of their offspring with Original Sin.
- Jesus, the embodiment of God, was born of a virgin and sent to sacrifice

his life for our sins by being crucified, and then later resurrected.
- The bible was inspired by God as an account of history and a manual to live our lives.
- Anyone who believes that Jesus was the son of God will go to Heaven when they die. Everyone else will burn in Hell for eternity.
- At some point in the near future, God will allow the entire earth to be destroyed.

### *Claims*

**Claim:** Christian scientists and teachers have been fired for their beliefs, a violation of their First Amendment rights.
**Counters:**
- Some scientists and teachers have been fired because they don't believe in the most basic principles of science, including the scientific method and proof of evidence. When they refuse to teach the well-proven concepts of evolution, natural selection, carbon dating, and the highly accepted theories like the big bang and abiogenesis, how can they expect to be an effective teacher or researcher of science?
- What if a Mormon doctor caused the death of his patient's because he refused to give them blood transfusions which are against his religion? What if a history teacher told his students that Holocaust never happened because they don't believe that it did? What if a math teacher believed that 2 + 2 = 5, and taught their students to believe them. Shouldn't they also be fired?
- Would you allow an atheist to preach in your church?

## 3.1.1 - God

The god of Christianity is simply referred to as "God" by Christians. Most Christians believe that God exists in three separate entities known as the Father (God), the Son (Jesus), and the Holy Spirit. Though these entities are separate, they are believed to be three parts of one god. Because Christianity was formed by Jewish rebels, the Father aspect of the Christian god is the same as the Jewish god. However, while the Jews claim that the prophet of their god has yet to be born, the Christians believe that Jesus of Nazareth was the biblical prophet and son of God, and while completely human, was also completely God. The third part of God is the Holy Ghost, which is the least well-defined aspect of God.

### *Claims About Proof*

This list of claims includes flawed arguments used by Christians to attempt to prove of God. They often use contradictions in logic, false dichotomies, or assertions without proof. Flaws in logic are not always obvious to observers who are unfamiliar with how academic logic works. However, by breaking an argument down into smaller steps, it becomes easier to see the inconsistencies.

Even if you can't find a contradiction in logic, there still may be one. Proof of God arguments usually fail to create a uniqueness proof, that is, they fail to prove that only the Christian god exists. A simple way to test this is to apply the Flying Spaghetti Monster Replacement Test. That is, replace "God" in the argument with "The Flying Spaghetti Monster". If the exact same argument can be used to prove that the Flying Spaghetti Monster exists, then the argument is clearly in error (either that or the Flying Spaghetti Monster really does exist).

**Claim:** Thomas Aquinas proved that God exists with his *Quinquae Viae*, or Five Ways.
**Counter:** The five proofs include: 1—The Argument of the Unmoved Mover, 2—The Argument of the First Cause, 3—The Argument From Contingency, 4—The Argument From Degree, 5—The Teleological Argument. Each one has its own faults which are addressed below.

**Claim:** Argument of the Unmoved Mover.

1. Some things are in motion.
2. Anything in motion must be moved by something else.
3. There can't be an infinite series of movers.
4. So there must be a first mover, and that mover is God.

**Counters:**

- This argument contains a contradiction. Point 2 claims that all moving things require a mover, but point 4 assumes that God doesn't require a mover which violates point 2.
- This argument fails to establish uniqueness of proof.
- Quantum physics has shown that not all things require a mover. Energy spontaneously forms in true vacuums as vacuum energy and causes measurable phenomena like the Casimir effect. Also gas molecules are known to spontaneously begin moving even when nothing interacts with them.

**Claim:** The Cosmological Argument (AKA Argument of the First Cause).

1. Everything has a cause.
2. Nothing can cause itself.
3. There can't be an infinite series of causes.
4. So there must be a first cause, and that cause is God.

**Counters:**

- This argument contains a contradiction. Point 2 claims that nothing can cause itself, but point 4 assumes that God caused himself which violates point 2. If God is exempt from requiring a cause, why isn't everything else?
- The Hartle-Hawking State explains how the universe could cause itself.
- This argument fails to establish uniqueness of proof.

**Claim:** Argument From Contingency.

1. Some things are contingent, meaning they may have the possibility to exist and to not exist.
2. All contingent things require a cause.
3. If everything was contingent, then there would be a time when nothing existed, and then nothing would exist now.
4. Since things do exist now, not everything is contingent.
5. That which is not contingent must always exist, and that is God.

**Counters:**

- Point 1 assumes that there are things which are not contingent, but this is *a posteriori*, not *a priori*, and must be proved with evidence. While everything that we're aware of is contingent, things that we're not aware of may not be contingent.
- Point 3 assumes that just because something is contingent there must be a time when it didn't exist. However, energy is contingent, but nobody can prove a time when energy did not exist.
- This argument fails to establish uniqueness of proof. If God isn't contingent, then other things, like the universe itself, do not have to be contingent either.

**Claim:** Argument From Degree.

1. Some things are greater than others.
2. Whatever is great to any degree gets its greatness from that which is the greatest.
3. So there must be a greatest being, which is the source of all greatness, and that thing is God.

**Counter:** This argument contains a contradiction. Point 1 claims that some things are greater than others, and point 2 follows up by claiming that anything which is great must have something greater than it. Thus, you have an infinite series of increasing greatness (i.e., something greater than God, or God + 1). The only way not to be part of the series is to not be great at all. Thus, if God is great, as claimed in point 3, point 2 is violated. However, if God is not great, he doesn't violate the points, but how could he be God if there are things greater than him?

**Claim**: Teleological Argument (AKA Argument From Design).

1. Everything is complex, orderly, and purposeful.
2. Anything that is complex, orderly, and purposeful must have a designer.
3. That designer is God.

**Counters:**

- Point 2 claims that anything that is complex, orderly, and purposeful requires a designer, but God is a complex, orderly, and purposeful construct. Therefore, God also requires a designer, which this argument ignores.
- Point 1 assumes that all things are orderly and purposeful. However, this is a matter of opinion. Many people disagree and claim that the universe does not appear to be designed at all, or if it was designed, it was designed very poorly. Also, in order to tell if something is orderly you must compare it to something that is less or more orderly than it. This is impossible with the universe because there is only one.

**Claim:** Pascal's Wager (AKA What If You're Wrong).

1. Either God exists or he doesn't.
2. If he doesn't exist, it doesn't matter if you believe in him or not.
3. If God does exist, you either believe in him or not.
4. If you don't believe in him you'll lose everything.
5. If you do believe in him you'll gain everything.
6. Therefore, the logical choice is to believe in God regardless of whether he exists or not.

**Counter:** This is a fallacy of logic called a false dilemma. Point 1 assumes that there are only two possible outcomes: the Christian god exists, or he doesn't. However, there are, in fact, an infinite number possibilities. If the Christians are right, you'll go to Hell. If the Jews are right, you'll go to Gehenna. If the Muslims are right, you'll go to Jahannam. If the Hindus are right, you'll go to Naraka, if Chinese folk religions are right, you'll go to Diyu. But they could all be wrong too. Maybe there is a god, but he's evil and sends all people to Hell. Maybe he's truly all-forgiving and sends all people to Heaven. Maybe he's indifferent and doesn't care about us in the least. Maybe he lets the bible get altered and doesn't care enough to fix it, or refuses to interfere with our lives, even if we change the bible.

You can play "what-if" as long as you want, but all of these statements are just as unlikely as the Christian god existing. All of these statements offer equally legitimate reasons for not believing in God.

**Claim:** The Miracles Argument.

1. The miracles of the bible are suspensions or violations of natural law.
2. Suspensions or violations of natural law can only be caused by a supernatural force.
3. That supernatural force is God.

**Counters:**

- Point 1 assumes that the bible is a factual account of history. It is much more likely that the bible was allegorical in nature, and that the miracles were just stories. The bible has many stories, yet most archaeological evidence doesn't support the authenticity of these stories. Likewise, most of the major events mentioned in the bible also have no supporting

geological or historical evidence. Thus, it is most likely that the bible is fiction.

- Point 2 assumes that just because you can't understand how something happened that it must be supernatural. However, history has shown us that all things that were originally thought to be supernatural have been shown to be natural. For example, many cultures thought that the sun and moon were moved by gods, but we now know that their movements are the result of gravity.

**Claim:** Ontological Argument.

1. God is defined as the most perfect being that can exist.
2. A perfect being that exists is more perfect than one that doesn't.
3. Therefore, by definition, a perfect being, God, must exist.

**Counters:**

- Point 2 assumes that existence is more perfect than non-existence, but offers no proof as to why existence would be more perfect than non-existence.
- Even if this argument were sound, it would only prove that the definition of God states that he exists, but just having a definition of something doesn't make it true.

**Claim:** Transcendental Argument.

1. Logical absolutes exist.
2. Logical absolutes are conceptual, not physical.
3. Because logical absolutes are conceptual they not dependent on space, time, physical properties, or human nature.
4. Logical Absolutes can not be the product of human minds, because human minds are different, not absolute.
5. Because logical absolutes are not authored by human minds, they must be authored by a transcendent mind.
6. This mind is called God.

**Counter:** Point 5 claims that logical absolutes, not being the product of human minds, must be authored by a transcendental mind. This is a false dichotomy. They could be authored by a third possibility (magic, spirit, essence, natural law, etc.). Alternately, they could "just be" and not need an author at all.

**Claim:** Special Experience Argument

1. I've had a special experience involving God.
2. Because of this special experience, I believe in God.
3. You should believe in God because of this experience I've had.

**Counters:**

- You are using the evidence of a special experience for your belief in God.
- God has not given me this special experience.
- Until God gives me this special experience I cannot come to the same conclusion as you.

## *Claims*

**Claim:** God exists outside of the universe, in a place where time doesn't exist, and therefore doesn't need to have a beginning or end.
**Counter:** The same could be said for the Flying Spaghetti Monster and the Invisible Pink Unicorn. If God doesn't exist in our universe, then no scientific test can be made to prove his existence. However, his effect on the world can be tested by measuring the results of prayer and faith healing, but those tests have shown that prayer and faith healing do not work. So, if God doesn't affect the universe at all, and we can't test for him in any way, we may as well not believe in him.

**Claim:** God unconditionally loves his creation.
**Counters:**

- The bible is full of instances where God hates his creation and murders people and animals alike. See *Table 3.1.2 E*.
- If God really loved us and was also all-powerful, then why doesn't he stop natural disasters from ending the lives of millions of innocent people each year?
- God afflicts thousands of his children with terrible defects like autism, down syndrome, cerebral palsy, and cystic fibrosis every single day. If he truly loved us, why does he smite children this way?
- God allows his children to burn in Hell for all of eternity without any chance of reprieve, just because they don't believe in him. That reaction is not consistent with unconditional love.

**Claim:** God allows his children to be maimed to test their loyalty or teach them humility.
**Counter:** If any parent in the world were to maim their child just to test their loyalty or teach them humility we would lock that parent up for child abuse. Yet, why is it that when God does it, it's considered justified, or even a blessing?

**Claim:** God is all-forgiving.
**Counter:** If God were all-forgiving then there wouldn't need to be a Hell, because God would forgive the sins of everyone regardless of whether or not they asked for forgiveness. If God has stipulations on who he will forgive, then he is certainly not all-forgiving. Most people's mortal parents will forgive their children's transgressions even if they don't ask for their forgiveness, thus making them even more forgiving than God.

**Claim:** If you truly love something, you will allow it to make mistakes and learn from them. As such, God granted us freewill.
**Counters:**

- Freewill cannot exists if two people ever disagree on an issue. Our ability to exercise our will on each other prevents freewill. For example,

if a person exercises their freewill by murdering someone else, the person they murdered loses their freewill. Likewise, every time a parent tells their child "no" they are halting that child's freewill.

- It's not "free" will if you pay a price. The bible is very clear that any deviation to God's laws will be met with the harshest punishment. Most often he orders death to anyone who breaks any of his commandments. He also recommends that people maim themselves if their body causes them to sin. See *Table 3.1.3 A*. When you die, if you exercised your freewill by choosing not to be a Christian, you'll burn in Hell for eternity.
- If freewill truly exists then Christian apologetics is not only impossible, but actually evil because it tries to take away freewill by proving that God exists.
- The very fact that there is a bible makes true freewill impossible because it tells you the price you pay for having freewill.

**Claim:** God is just.
**Counters:**

- God deals with all unforgiven sins in the same manner: permanent banishment to Hell. This means that God thinks that a white lie is equal to mass murder. This is contradictory to justice.
- According to the bible, there is no reprieve from Hell ("*And these shall go away into everlasting punishment.*" Matthew 25:46 KJV). This means that regardless of how much or how little you sinned in life, if you fail to ask forgiveness, you will burn in Hell forever. This assumes either that God doesn't allow sinners in Hell to become good, or he doesn't care if they become good. Either reaction is inconsistent with justice.
- Every year millions of innocent people are maimed, raped, and murdered. God allows this to happen, yet Christians still declare him just.
- Every year thousands of innocent people are killed in natural disasters like floods, hurricanes, earthquakes, mudslides, tsunamis, volcanoes, fires, drought, etc. God has the ability to prevent their death but he does not. Is everyone who is killed in a natural disaster a terrible sinner, or does God just not care that innocent people are constantly dying painful deaths?

**Claim:** God cannot be immoral. Even if something seems immoral to us, when God does it it is morally justified because everything God does it good.
**Counter:** The God of the bible demands higher standards for us to follow than he is willing to follow. This creates a double-standard on morality demonstrating that there is no "higher form" of morals, but a subjective set. The bible describes God doing many things that humans would consider immoral (murder, infanticide, deception, etc., see *Table 3.1.2 E*). If a supposedly all-good God cannot follow his own rules, why should we?

**Claim:** God gave us life, so he can take it away.
**Counter:** This argument also pleads special morality for God. If a parent were to kill their child, we would put them in prison. Just because you give something life doesn't give you a moral right to also murder it.

**Claim:** God is omnipotent.
**Counter:** Claiming that something is omnipotent, or all-powerful, causes the "omnipotence paradox". Posit that if God were all powerful he should be able to create a rock so heavy that even he couldn't lift it. However, if he can't lift it, he is not all-powerful, and if he can't create it, he is also not all powerful. Also, being omnipotent contradicts being omni-benevolent. If God can do anything he wants, he should be able to do evil things, yet if he is omni-benevolent then he cannot do evil things, and is therefore not all-powerful.

**Claim:** Being omnipotent doesn't mean the ability to do what ever you want; our mortal minds can't comprehend what true omnipotence is.
**Counter:** Then you should really consider using a different word since "omnipotent" is defined in most dictionaries as "*having unlimited power or authority.*" Perhaps, you should claim that God is semi-omnipotent or pseudo-omnipotent.

**Claim:** God is infallible and never makes mistakes.
**Counter:** There are several instances in the bible that can be interpreted as God making a mistake, including:

- God creates the universe, all living things, and then man and declares his creation good (Genesis 1:31 KJV). However, shortly thereafter, God realizes that his creation of man was not good (Genesis 2:18) because man becomes bored, and so God has to create women. This shows that he made a mistake in calling his creation good.
- God creates people on earth and says they're good (Genesis 1:31 KJV), but shortly thereafter realizes that people are evil (Genesis 6:6 KJV) and kills almost all of them. This shows, again, that God made a mistake in calling his creation good.
- God supposedly wrote the bible, but the bible contains many contradictions. See *Table 3.1.2 C* and *Table 3.1.2 D*.
- God made many prophecies in the bible, many of which did not come true. See *Table 3.1.2 F.*

# 3.1.2 – Bible

The bible is the fundamental book that Christians base their religion on. Most Christians view the bible as a infallible book that was written by or inspired by God and contains everything that a Christian needs to know about morality and the history of the universe.

The bible is a collection of several ancient texts separated into two major volumes called the Old and New Testaments. Each Testament is broken up into several books. The Old Testament is based off of the Jewish Tanakh. The original Tanakh has been lost over time and only copies, of who-knows how many generations, exist.

The Christian bible exists in many different versions for many different Christian denominations. While the books of the most recent volume—the New Testament—are mostly agreed upon (although the order in which they're presented is not), there is a major disagreement among Christians as to which books should be canon in the older volume—the Old Testament. Each major sect of Christianity picks several books from many ancient texts and adds in those they claim are the "correct" ones, ignoring the others. Those books that don't fit into a sect's biblical canon are referred to as the Apocrypha and are very disputed.

See *Table 3.1.2 A* for information regarding the sources of the bible.

*Table 3.1.2 A - Biblical Sources*

| Section | Modern Source | Originally Written | Books |
|---|---|---|---|
| Old Testament | Masoretic Hebrew | c. 1100-100 BCE | Up to 69 |
| New Testament | Received Ancient Greek | c. 45-140 CE | 27 |
| Apocrypha | Greek Sepuagint/Vulgate | prior to 200 BCE | Up to 20 |

**Claim:** The bible is perfect and infallible.
**Counters:**

- The bible was written by humans. Humans are not perfect. Therefore the bible cannot be perfect.
- The original bible no longer exists, so it is impossible to prove that the copies of the bible are the same as the original. However, since all of the copies have slight differences between them, they cannot be the same as the original.
- All modern bibles have undergone translations which alter the precise meaning of the original text.
- The bible contains many contradictions and errors. See *Table 3.1.2 C* and *Table 3.1.2 D*.

**Claim:** God wrote the bible, and God is perfect, therefore the bible is perfect.
**Counter:** Even if the original bible was written by God and perfect, it doesn't matter because the original scrolls that the bible is based on don't exist anymore. All reproductions of the bible are made by humans, and humans are not perfect. Therefore, all bibles that currently exists cannot be perfect.

**Claim:** Humans wrote the bible through God's guidance to ensure its perfection.

**Counter:** It doesn't matter if the original bible was perfect because the original bible no longer exists. Regardless, bibles have changed over the years and are subject to the same language gaps, misinterpretations, typographical errors, and various other causes of change over time.

**Claim:** The bible is a Christian book.
**Counter:** The entirety of the Old Testament is based off of the Jewish Tanakh, only the New Testament is unique to Christianity.

**Claim:** God will not allow the bible to be altered.
**Counters:**

- If that were true there should only be one version of the bible and it should never be revised. However, there are many versions of the English bible alone, and many of those versions have been revised. See *Table 3.1.2 B* for a list of the various versions of the English bible.
- Then why does each sect of Christianity have their own version of it? Why is there conflict among Catholics, Protestants, and Mormons as to which version is correct? Why are there groups that fight over which translation of the bible is correct, like the King-James-Only Movement?
- The printing of the bible is subject to the same rules that govern non-divine printing. A 1631 English bible read, "*Thou **shalt** commit adultery.*" A 1653 bible printed in Cambridge, England read, "*Know ye not that the **unrighteous** shall inherit the kingdom of God?*"

*Table 3.1.2 B - Versions of the English Bible*

| Abbr. | Title | Pub. | Rev. |
|---|---|---|---|
| | Wyclif's Bible | 1382 | 1395 |
| | Tyndale Bible | 1525 | |
| | Coverdale Bible | 1535 | |
| | Matthew Bible | 1537 | |
| | Great Bible | 1539 | |
| | Taverner's Bible | 1539 | 1541 |
| | Geneva Bible | 1560 | |
| | Bishop's Bible | 1568 | 1572 |
| | Douay-Rheims Bible | 1582 | 1752 |
| KJV | Authorized King James Version | 1611 | 1769 |
| | Quaker Bible | 1764 | |
| | Thompson's Translation | 1808 | |
| JST | Joseph Smith Translation | 1830 | |
| | Webster's Revision | 1833 | |
| YLT | Young's Literal Translation | 1862 | |
| | Julia E. Smith Parker Translation | 1876 | |
| RV | Revised Version | 1881 | |

| | | | |
|---|---|---|---|
| | Darby Bible | 1890 | |
| ASV | American Standard Version | 1901 | 1929 |
| ERB | Rotherham Emphasized Bible | 1902 | |
| | Ferrar Fenton Bible | 1903 | |
| BBE | Bible In Basic English | 1949 | 1965 |
| NWT | New World Translation | 1950 | |
| RSV | Revised Standard Version | 1952 | 1971 |
| NEB | New English Bible | 1970 | |
| NASB | New American Standard Bible | 1971 | 1995 |
| TLB | The Living Bible | 1971 | |
| GNB | Good News Bible | 1976 | |
| TEV | Today's English Version | 1976 | |
| NIV | New International Version | 1978 | |
| SEB | Simple English Bible | 1980 | |
| NKJV | New King James Version | 1982 | |
| NLV | New Life Version | 1986 | |
| ERV | Easy-to-Read Version | 1989 | |
| NRSV | New Revised Standard Version | 1989 | |
| REB | Revised English Bible | 1989 | |
| KJ21 | 21st Century King James Version | 1991 | |
| NCV | New Century Version | 1991 | |
| CEV | Contemporary English Version | 1995 | |
| GW | God's Word | 1995 | |
| NIrV | New International Reader's Version | 1996 | |
| NIVI | New International Version Inclusive Edition | 1996 | |
| NLT | New Living Translation | 1996 | 2004 |
| AKJV | American King James Version | 1999 | |
| MKJV | Modern King James Version | 1999 | |
| | Recovery Version | 1999 | |
| KJV2K | King James 2000 Version | 2000 | |
| WEB | World English Bible | 2000 | |
| HSV | Holy Scriptures Version | 2001 | |
| EEB | Easy English Bible | 2001 | |
| ESV | English Standard Version | 2001 | |
| MSG | The Message | 2002 | |
| CKJV | Comfort-able King James Version | 2003 | |
| NCPB | New Cambridge Paragraph Bible | 2005 | |
| NET | New English Translation | 2005 | |
| TNIV | Today's New International Version | 2005 | |
| AV7 | AV7 New Authorized Version | 2006 | |

**Claim:** People are afraid to alter the bible because of the curse in Revelation 22:18-19.
**Counter:** This "curse" has done nothing to stop various Christian sects from picking and choosing which books of the bible they will include in their particular version or adding their own custom-made books.

**Claim:** The bible is the same across all translations.
**Counters:**

- According to SIL International (a group concerned with bible translations) the bible has been translated into over 2,400 languages. Each translation has the potential for error.
- The process of translation requires human judgment to decide how the translation will take place, and human judgment is flawed. For example: an English speaker may say "see you later", but they wouldn't say "with re-examination". However, a French speaker would say "with re-examination", because that's the direct translation of *au revoir*. Thus, the words must be altered using human judgment to be properly translated
- Another reason translations cannot be made directly is because of figures of speech and idioms are often very difficult to translate well. For example, the German phrase *Bananenfalte* literally means "banana fold". Without a native German speaker to explain what the word means you would never know that it refers to the wrinkles you get between your thigh and buttocks.
- Translations are made even more difficult when archaic terms are used that are lost in time. For example: In Genesis 6:14 KJV, God commands Noah to build the ark out of "gopher wood". But nobody knows what "gopher wood" is. Various other translations alter "gopher wood" to mean cedar beams, squared timber, reeds, planed wood, pitched wood, etc., but nobody knows the correct answer.
- English is an Indo-European language, while the Old Testament's Hebrew is an ancient Afro-Asiatic language. These are very far apart in the language tree. The bigger the difference between two languages the harder they are to translate accurately.
- Many words don't translate well. The English word "couple" can mean two, multiple, several, a pair, more than one, etc. Unless the author explicitly defines these words the reader can't know for certain which definition was meant. This is important because the Ancient Hebrew words like this can no longer be translated properly.
- The ancient Hebrew texts require a great deal of interpretation. Even the name of God, "Yahweh", must be interpreted because the ancient Hebrew writing didn't record vowels. Yahweh is actually written as "yhwh". Yahweh could just as properly be written "Yehwah", "Yohwoh", "Yuhwuh", or with any other vowel variation.
- Because translations must alter the wording of the text, the bible can only contain the spirit of the original text, not the precise meaning. This is important to note because so many people strictly follow the letter of the bible. However, following the letter of the bible is flawed because

you are actually looking at a translated copy of a copy, of who knows how many copies before that.

**Claim:** The bible doesn't contradict itself.
**Counter:** The bible contains a great number of contradictions in the Gospels alone. See *Table 3.1.2 C*.

*Table 3.1.2 C - Contradictions In the Gospels*

| |
|---|
| **Acts 13:38-39** states that all sins *can be forgiven*, but **Mark 3:28-29** says that blaspheming the Holy Spirit is *unforgivable*. |
| **Matthew 1:2-17** lists *27* generations from David to Jesus, but **Luke 3:23-38** lists *42* generations from David to Jesus and, excluding Joseph, only two of the names match up between the two. |
| **Matthew 5:16** and **I Peter 2:12** say that you *should* let your good works be seen by others, but **Matthew 6:1-4** and **Matthew 23:3-5** says that you *should not* let people see your good deeds. |
| Jesus *condemns* public prayer in **Matthew 6:5-6**, but Paul *encourages* public prayer in **I Timothy 2:8**. |
| **Matthew 1:16** says that the father of Joseph (Jesus' father) was *Jacob*, but **Luke 3:23** says that Joseph's father was *Heli*. |
| In **Matthew 28:19** Jesus tells his disciples (including Paul) to go and *baptize* the nations, but in **I Corinthians 1:17** Paul says that Christ sent him *not to baptize*, but to preach. |
| **Matthew 1:2** says there are thirteen generations between Abraham to David, but right afterward **Matthew 1:17** says there are fourteen. Likewise, **Matthew 1:12-16** has thirteen generations from the Babylon captivity to Christ's birth, but **Matthew 1:17** says fourteen. |
| In **Matthew 10:10** Jesus instructs his disciples not to take anything with them *including* staffs or sandals, but in **Mark 6:8-9** Jesus tells them not to take anything *except* for staffs and sandals. |
| In **John 18:31** the Jews say that their law *prohibits* them from putting Jesus to death, but right after, in **John 19:7**, the Jews say that their law *mandates* that they put Jesus to death. |
| Christ's sermon is in the *mountains* in **Matthew 5:1-2**, but **Luke 6:17 & 20** it's in the *plains*. |
| Jairus claims his daughter is *dead* in **Matthew 9:18**, in **Luke 8:41-42** he says she is *dying*. |

| |
|---|
| In **Matthew 11:2-3** and **Luke 7:18-22** John the Baptist is in prison and sends out his followers *to see* if Jesus is the Messiah, but **John 1 :29-34, 36** John the Baptist *already knows* that Jesus is the Messiah. |
| **Matthew 27:5** says that Judas *hanged himself*, but **Acts 1:15-18** says that Judas *exploded in a field*. |
| In **Matthew 15:22** a woman from *Canaan* comes to Jesus to heal her daughter, in **Mark 7:26** the woman is *Greek*. |
| In **Matthew 20:20-21** *Zebedee* asks Jesus that her children may sit beside him in his kingdom, but in **Mark 10:35-37** Zebedee's *children* ask Jesus. |
| **Matthew 20:30** says that *two* blind men seek Jesus, but in **Luke 18:35-38** there is only *one* blind man. |
| In **Matthew 21:2-7** Jesus tells his disciples to bring an *ass* and a colt from the village of Bethphage, but in **Mark 11:2-7** he asks for only a *colt*. |
| In **Matthew 21:19** Jesus wants fruit from a fig tree, but the fig tree has no fruit so Jesus curses the tree and *immediately* withers away to his disciple's astonishment. However, in **Mark 11:12-14 & 20** fig tree doesn't whither until the *next day.* |
| **Matthew 21:17-19** says that Jesus cursed the fig tree *after* purging the temple, but in **Mark 11:14-15 & 20** he curses it *before* the purging. |
| John was *in prison* when Jesus went into Galilee in **Mark 1:14**, but he was *not* in prison in **John 1:43 & 3:22-24**. |
| **Matthew 28:15-17** says that Jesus appeared to his disciples after the crucifixion on a *mountain in Galilee*, but **Luke 24:32-37** states he appeared to them in a *room in Jerusalem*. |
| In **Matthew 5:1, 6:9-13, and 7:28** Jesus delivers the Lord's Prayer during the Sermon on the Mount before the multitudes. However, in **Luke 11:1-4** he delivers the prayer with only his disciples to see. |
| **Mark 15:25** states that Jesus was crucified on the *third* hour of passover, but **John 19:14-15** says the *sixth* hour. |
| In **Matthew 27:44** and **Mark 15:32** *both* of the thieves that are crucified along with Jesus mock him, but in **Luke 23:39-40** only *one* does. |
| In **John 13:27** Satan enters Judas during supper, but in **Luke 23:3-4, 7** he doesn't enter Judas until after supper. |
| **Matthew 8:5-7** claims that a *Centurion* approached Jesus beseeching help for a sick servant, but in **Luke 7:3 & 7:6-7** the Centurion sent *friends and elders* of the Jews. |

| |
|---|
| **Mark 16:2** sets the time at *sunrise* when the *two* women went to the sepulcher, but it's still dark in **John 20:1** when Mary Magdalene went *alone* to the sepulcher. |
| In **Matthew 8:3-4** Jesus heals a leper *before* visiting Simon's house, but in **Mark 1:29-30 & 1:40-42** Jesus heals the leper *after* visiting Simon's house. |
| Satan first takes Jesus to the *parapet* of the temple and then to a high mountain in **Matthew 4:5-8**, however in **Luke 4:5-9** Satan first takes him to the *mountain* and then to the parapet. |
| In **Matthew 28:2** *one sitting* angel is seen outside the sepulcher. In **Luke 24:4** there are *two* angels and they're *standing*. |
| In **Mark 16:5** there is *one* angel in the sepulcher, but in **John 20:12** there are *two*. |
| **John 3:13** says that *no man* has ever ascended to heaven except those who descended from heaven, but in **I Kings 2:11**, *Elijah* ascends to heaven. |

**Claim:** Even if several eye witnesses of a car crash got minor details wrong about the crash, it would be stupid to just assume that the car crash never happened. In the same regard, just because some minor details in the bible aren't exactly the same in each book doesn't mean that it never happened.
**Counters:**

- For an ordinary car crash I wouldn't be such a stickler of the details. However, if you told me that you had a magic flying car powered by rainbows that crashed into a purple dragon, I'd be more critical to your inconsistencies. We're talking about a man who can walk on water, raise people from the dead, cure blindness, and is the resurrected incarnation of God. A story that extraordinary needs equally extraordinary evidence, not a series of contradicting accounts made a century after the events happened.
- There are several major inconsistencies in the bible:
  - Jesus' family tree is different by 27 generations.
  - Whether or not all sins can be forgiven contradicts.
  - Whether or not Mary was a virgin, and even if she was impregnated by the Holy Ghost is in doubt.
- The bible is supposed to be written by God. There shouldn't be any errors at all. Every "i" should be dotted—every "t" crossed. There shouldn't even be room to argue an inconsistency.
- If the police want to check to see how a car crash occurred, they would interview each person separately. If they people were lying about the crash, the police would expect to find inconsistencies between their stories. In the same way, because there are so many inconsistencies in the bible, we can assume that the authors are lying.

**Claim:** The bible is 100% factual.
**Counter:** The bible contains several errors. See *Table 3.1.2 D*.

*Table 3.1.2 D - Errors In the Bible*

| |
|---|
| **The bible claims that the Earth is flat.**<br><br>"*The heavens declare the glory of God; and the **firmament** sheweth his handywork. Day unto day uttereth speech, and night unto night sheweth knowledge. There is no speech nor language, where their voice is not heard. Their line is gone out through all the earth, and their words to the **end of the world**. In them hath he set a tabernacle for the sun, which is as a bridegroom coming out of his chamber, and rejoiceth as a strong man to run a race. His going forth is from the **end of the heaven**, and his circuit unto the **ends of it**: and there is nothing hid from the heat thereof.*" (Psalms 19:1-6 KJV)<br><br>"*It is he that sitteth upon the **circle** of the earth…*" (Isaiah 40:22) |
| **The bible claims that the Earth doesn't move.**<br><br>"*The Lord reigneth, he is clothed with majesty; the Lord is clothed with strength, wherewith he hath girded himself: the world also is stablished, that it **cannot be moved**.*" (Psalms 93:1 KJV)<br><br>This was the popular belief of the Church as they censored the work of Copernicus and Galileo all the way into the 1700s. Even to this day, some Christian groups like the *Association for Biblical Astronomy* still believe that the Earth is the center of the universe and doesn't move. |
| **The bible claims the the universe doesn't change.**<br><br>"*And God called the **firmament** Heaven.*" (Genesis 1:8 KJV)<br><br>"*And God set them in the **firmament** of the heaven to give light upon the earth…*" (Genesis 1:17 KJV) |
| **The bible advocates astrology.**<br><br>"*And God said, Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for **signs**…*" (Genesis 1:14 KJV)<br><br>"*Saying, Where is he that is born King of the Jews? For we have seen **his star** in the east, and are come to worship him.*" (Matthew 2:2 KJV)<br><br>"*And there shall be **signs in the sun, and in the moon, and in the stars**…*" (Luke 21:25 KJV) |

**The bible claims that $\pi$ is exactly equal to 3.**

"*And he made a molten sea, ten cubits from the one brim to the other* [diameter]*: it was round all about, and his height was five cubits: and a line of* ***thirty*** *cubits did compass it round about* [circumference]." (I Kings 7:23 KJV)

Using the correct geometrical equation for the circumference of a circle ($c = \pi d$ or $c = \pi r^2$), a circle with a ten cubit diameter has a circumference of 31.4159… cubits, not 30. As early as 2000 BCE it was known that $\pi$ was closer to 3.14 than 3, and I Kings was written around 900 BCE.

**The bible fails in simple arithmetic.**

Ezra 2:1-63 makes a large list of people who went out of captivity. If you tally up the numbers you get 29,798. But the next verse reads,

"*The whole congregation together was forty and two thousand three hundred and threescore.*" (Ezra 2:64 KJV)

The bible records each group to the single person, but they claim a total of 42,360, when the actual count is 29,798, over 10,000 off. If you include the numbers of slaves, women, and animals listed after that total, you exceed the total by several thousand. The numbers don't add up either way.

**The bible contains animals that don't exist like dragons and unicorns, and even animals that talk.**

"*Now the* ***serpent*** *was more subtil than any beast of the field which the LORD God had made. And he* ***said*** *unto the woman, Yea, hath God said, Ye shall not eat of every tree of the garden?*" (Genesis 3:1 KJV)

"*And the LORD opened the mouth of the ass, and she* ***said*** *unto Balaam, What have I done unto thee, that thou hast smitten me these three times? And Balaam said unto the ass, Because thou hast mocked me: I would there were a sword in mine hand, for now would I kill thee. And the* ***ass said*** *unto Balaam, Am not I thine ass, upon which thou hast ridden ever since I was thine unto this day? was I ever wont to do so unto thee? And he said, Nay.*" (Numbers 22:28-30 KJV)

"*Will the* ***unicorn*** *be willing to serve thee, or abide by thy crib? Canst thou bind the* ***unicorn*** *with his band in the furrow? or will he harrow the valleys after thee?*" (Job 30:9-10 KJV)

"*Behold now* ***behemoth****, which I made with thee; he eateth grass as an ox. Lo now, his strength is in his loins, and his force is in the navel of his belly. He moveth his tail like a cedar: the sinews of his stones are wrapped together.*

*His bones are as strong pieces of brass; his bones are like bars of iron. He is the chief of the ways of God: he that made him can make his sword to approach unto him. Surely the mountains bring him forth food, where all the beasts of the field play. He lieth under the shady trees, in the covert of the reed, and fens. The shady trees cover him with their shadow; the willows of the brook compass him about. Behold, he drinketh up a river, and hasteth not: he trusteth that he can draw up Jordan into his mouth. He taketh it with his eyes: his nose pierceth through snares.*" (Job 40:15-24)

"*He maketh them also to skip like a calf; Lebanon and Sirion like a young* ***unicorn****.*"(Psalms 29:6 KJV)

"*Rejoice not thou, whole Palestina, because the rod of him that smote thee is broken: for out of the serpent's root shall come forth a* ***cockatrice****, and his fruit shall be a* ***fiery flying serpent****.*" (Isaiah 14:29 KJV)

"*In that day the LORD with his sore and great and strong sword shall punish* ***leviathan*** *the piercing serpent, even* ***leviathan*** *that crooked serpent; and he shall slay the* ***dragon*** *that is in the sea.*" (Isaiah 27:1 KJV)

"*The burden of the beasts of the south: into the land of trouble and anguish, from whence come the young and old lion, the viper and* ***fiery flying serpent****…*" (Isaiah 30:6 KJV)

"*And the* ***unicorns*** *shall come down with them, and the bullocks with the bulls…*" (Isaiah 34:7 KJV)

"*And thorns shall come up in her palaces, nettles and brambles in the fortresses thereof: and it shall be an habitation of* ***dragons****, and a court for owls. The wild beasts of the desert shall also meet with the wild beasts of the island, and the* ***satyr*** *shall cry to his fellow; the screech owl also shall rest there, and find for herself a place of rest.*" (Isaiah 34:13-14 KJV)

"*For, behold, I will send serpents,* ***cockatrices****, among you, which will not be charmed, and they shall bite you, saith the LORD.*" (Jeremiah 8:17)

Obviously, the remains of unicorns, dragons, satyrs, cockatrices, and fiery flying snakes have never been found. If the authors of the bible are simply taking poetic liberties, then the entire bible may be composed of poetic liberties. However, if the authors of the bible actually believed in creatures that don't exist, then the bible is in error.

**The bible incorrectly groups bats with birds.**

"*And these are they which ye shall have in abomination among the* ***fowls****; they shall not be eaten, they are an abomination: the eagle, and the ossifrage, and the ospray, And the vulture, and the kite after his kind; Every raven after his kind; And the owl, and the night hawk, and the cuckow, and the hawk after his kind, And the little owl, and the cormorant, and the great owl, And the swan, and the pelican, and the gier eagle, And the stork, the heron after her kind, and the lapwing, and the* ***bat****.*"(Leviticus 11:14-19 KJV)

**Claim:** When the bible was written people didn't have the modern classifications for animals that we now have. Therefore, it is acceptable for the bible to group bats in with birds.
**Counter:** If we are to assume that God wrote the bible, than we should also expect it to be free from errors of ignorance. While the people alive during the writing of Leviticus were ignorant to the differences between birds and bats, God should not have been, and should have grouped them with rodents accordingly. Such an oversight only helps to prove that the bible was written by fallible humans. Regardless, this argument also demonstrates that the bible becomes less useful to future generations.

**Claim:** The Hebrew word used is *owph* which the KJV translates to "fowl". However, *owph* more accurately translates to "flying creatures" or "creatures with wings".
**Counter:** This argument demonstrates that the translation of the KJV bible is inaccurate or, at the very least, ambiguous. If that is true, then we can assume the rest of the bible's translation may be inaccurate as well.

**Claim:** The bible gives us our morals.
**Counters:**

- The bible is incredibly immoral. See *Table 3.1.2 E*.
- Science shows us that some of our morals come from our genetics (Darwin 1871, Hamilton 1964, Grafen 1985, Sober and Wilson 1998, Frank 1998, Boyd and McIlreath 2006).
- Morals are defined by culture. The morals of every culture, regardless of the dominant religion of the culture, change over time even if the religion does not. The USA once permitted slavery and treating woman like property, as written the bible. However, as the culture of the USA changed to abolish slavery and grant women equal rights, so to did the morality of the country. Even though the bible still states that slavery and treating women as property is acceptable (along with racism, war, and polygamy), most Christians in the US have instead adopted the morals of their culture.

*Table 3.1.2 E - Immorality the English Bible*

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| **God lies to Adam telling him he will die if he eats the forbidden fruit, but he doesn't die:** "*And the LORD God commanded the man, saying, Of every tree of the garden thou mayest freely eat: But of the tree of the knowledge of good and evil, thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die.*" (Genesis 2:16-17 KJV) |
| **God murders almost every living thing on earth:** "*And all flesh died that moved upon the earth, both of fowl, and of cattle, and of beast, and of every creeping thing that creepeth upon the earth, and every man: All in whose nostrils was the breath of life, of all that was in the dry land, died. And every living substance was destroyed which was upon the face of the ground, both man, and cattle, and the creeping things, and the fowl of the heaven; and they were destroyed from the earth: and Noah only remained alive, and they that were with him in the ark.*" (Genesis 7:21-23 KJV) |
| **God deceives Abraham by telling him to murder his son, and just before Abraham does, God stops him:** "*And it came to pass after these things, that God did tempt Abraham, and said unto him, Abraham: and he said, Behold, here I am. And he said, Take now thy son, thine only son Isaac, whom thou lovest, and get thee into the land of Moriah; and offer him there for a burnt offering upon one of the mountains which I will tell thee of. And Abraham rose up early in the morning, and saddled his ass, and took two of his young men with him, and Isaac his son, and clave the wood for the burnt offering, and rose up, and went unto the place of which God had told him. Then on the third day Abraham lifted up his eyes, and saw the place afar off. And Abraham said unto his young men, Abide ye here with the ass; and I and the lad will go yonder and worship, and come again to you. And Abraham took the wood of the burnt offering, and laid it upon Isaac his son; and he took the fire in his hand, and a knife; and they went both of them together. And Isaac spake unto Abraham his father, and said, My father: and he said, Here am I, my son. And he said, Behold the fire and the wood: but where is the lamb for a burnt offering? And Abraham said, My son, God will provide himself a lamb for a burnt offering: so they went both of them together. And they came to the place which God had told him of; and Abraham built an altar there, and laid the wood in order, and bound Isaac his son, and laid him on the altar upon the wood. And Abraham stretched forth his hand, and took the knife to slay his son. And the angel of the LORD called unto him out of heaven, and said, Abraham, Abraham: and he said, Here am I. And he said, Lay not thine hand upon the lad, neither do thou any thing unto him: for now I know that thou fearest God, seeing thou hast not withheld thy son, thine only son from me.*" (Genesis 22:1-12 KJV) |
| **God murders children because of the crimes of their fathers:** "*And it came to pass, that at midnight the Lord smote all the firstborn in the land of Egypt, from the firstborn of Pharaoh that sat on his throne unto the firstborn of the captive that was in the dungeon; and all the firstborn of cattle. And* |

*Pharaoh rose up in the night, he, and all his servants, and all the Egyptians; and there was a great cry in Egypt; for there was not a house where there was not one dead.*" (Exodus 12:29-30 KJV)

**God allows you to sell your own children as sex slaves, female slaves have less value than male slaves, and polygamy is allowed:** "*When a man sells his daughter as a slave, she will not be freed at the end of six years as the men are. If she does not please the man who bought her, he may allow her to be bought back again. But he is not allowed to sell her to foreigners, since he is the one who broke the contract with her. And if the slave girl's owner arranges for her to marry his son, he may no longer treat her as a slave girl, but he must treat her as his daughter. If he himself marries her and then takes another wife, he may not reduce her food or clothing or fail to sleep with her as his wife. If he fails in any of these three ways, she may leave as a free woman without making any payment.*" (Exodus 21:7-11 NLT)

**God allows permanent slavery, even with children:** "*However, you may purchase male or female slaves from among the foreigners who live among you. You may also purchase the children of such resident foreigners, including those who have been born in your land. You may treat them as your property, passing them on to your children as a permanent inheritance. You may treat your slaves like this, but the people of Israel, your relatives, must never be treated this way.*" (Leviticus 25:44-46 NLT)

**God forces wild beasts to murder children:** "*And if ye walk contrary unto me, and will not hearken unto me; I will bring seven times more plagues upon you according to your sins. I will also send wild beasts among you, which shall rob you of your children, and destroy your cattle, and make you few in number; and your high ways shall be desolate.*" (Leviticus 26:21-22 KJV)

**If you take a woman prisoner you must wait a month before you can forcibly marry and rape her, and if you get bored with her you can only free her, not sell her:** "*When you go out to war against your enemies and the Lord, your God, delivers them into your hand, so that you take captives, if you see a comely woman among the captives and become so enamored of her that you wish to have her as wife, you may take her home to your house. But before she may live there, she must shave her head and pare her nails and lay aside her captive's garb. After she has mourned her father and mother for a full month, you may have relations with her, and you shall be her husband and she shall be your wife. However, if later on you lose your liking for her, you shall give her her freedom, if she wishes it; but you shall not sell her or enslave her, since she was married to you under compulsion.*" (Deuteronomy 21:10-14 NAB)

**If rape victims don't cry out loud enough they are put to death:** "*If within the city a man comes upon a maiden who is betrothed, and has relations with her, you shall bring them both out of the gate of the city and there stone them to death: the girl because she did not cry out for help though she was in the*

*city, and the man because he violated his neighbors wife.*" (Deuteronomy 22:23-24 NAB)

**Rape victims must marry their rapists and be paid for:** "*If a man is caught in the act of raping a young woman who is not engaged, he must pay fifty pieces of silver to her father. Then he must marry the young woman because he violated her, and he will never be allowed to divorce her.*" (Deuteronomy 22:28-29 NLT)

**David murders someone, rapes his wife, and impregnates her. God punishes David by letting his neighbor publicly rape all of his wives and then God murders David's child:** "*Now therefore the sword shall never depart from thine house; because thou hast despised me, and hast taken the wife of Uriah the Hittite to be thy wife. Thus saith the Lord, Behold, I will raise up evil against thee out of thine own house, and I will take thy wives before thine eyes, and give them unto thy neighbor, and he shall lie with thy wives in the sight of this sun. For thou didst it secretly: but I will do this thing before all Israel, and before the sun. And David said unto Nathan, I have sinned against the Lord. And Nathan said unto David, The Lord also hath put away thy sin; thou shalt not die. Howbeit, because by this deed thou hast given great occasion to the enemies of the Lord to blaspheme, the child also that is born unto thee shall surely die.*" (2 Samuel 12:10-14 KJV)

**Elisha invokes the name of the Lord to have bears murder 42 children because they made fun of his bald head:** "*And he went up from thence unto Bethel: and as he was going up by the way, there came forth little children out of the city, and mocked him, and said unto him, Go up, thou bald head; go up, thou bald head. And he turned back, and looked on them, and cursed them in the name of the LORD. And there came forth two she bears out of the wood, and tare forty and two children of them.*" (2 Kings 2:22-23 KJV)

**God murders the family and animals of Job, including seven sons, three daughters, all of their slaves, seven thousand sheep, three thousand camels, five hundred yoke of oxen, five hundred she asses, just to prove a point to Satan:** (Job KJV)

**God commands the murder of children for the crimes of their fathers, again:** "*Make ready to slaughter his sons for the guilt of their fathers; Lest they rise and posses the earth, and fill the breadth of the world with tyrants.*" (Isaiah 14:21 NAB)

**God murders children and causes abortions and infanticide for the crimes of the children's parents:** "*'The glory of Israel will fly away like a bird, for your children will die at birth or perish in the womb or never even be conceived. Even if your children do survive to grow up, I will take them from you. It will be a terrible day when I turn away and leave you alone. I have watched Israel become as beautiful and pleasant as Tyre. But now Israel will bring out her children to be slaughtered.' O Lord, what should I*

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| *request for your people? I will ask for wombs that don't give birth and breasts that give no milk. The Lord says, 'All their wickedness began at Gilgal; there I began to hate them. I will drive them from my land because of their evil actions. I will love them no more because all their leaders are rebels. The people of Israel are stricken. Their roots are dried up; they will bear no more fruit. And if they give birth, I will slaughter their beloved children.'*" (Hosea 9:11-16 NLT) |
| **God demands that slaves should serve their masters as they should serve Christ:** "*Slaves, obey your earthly masters with deep respect and fear. Serve them sincerely as you would serve Christ."* (Ephesians 6:5 NLT) |
| **God even allows Christians to be slaves, and demands that they be good slaves:** "*Christians who are slaves should give their masters full respect so that the name of God and his teaching will not be shamed. If your master is a Christian, that is no excuse for being disrespectful. You should work all the harder because you are helping another believer by your efforts. Teach these truths, Timothy, and encourage everyone to obey them.*" (1 Timothy 6:1-2 NLT) |

**Claim:** The stories in the bible happened precisely as they were written.
**Counters:** The bible is sketchy on the specific details of several stories, often recounting aspects differently in various passages. This would be expected if the stories in the bible were the result of several cultures coming together and combining their mythologies. For example:

- Adam and Eve are created twice. Once in Genesis 1:27 and again in Genesis 2:7 and 2:21.
- God commands for two of each animal to be put into the ark in Genesis 6:19, but later in Genesis 7:2 he wants seven of each clean beast.
- The conflict with Lot, the angels, and the people of Sodom from Genesis 19:1-16 is retold almost exactly with different people in a different location in Judges 19:22-29.
- There are many contradictions in the gospel regarding the birth, life, death, and resurrection of Jesus. See *Table 3.1.2 C*.

**Claim:** The bible tells us to wash our hands indicating that the bible knew about bacteria before humans.
**Counter:** The ritual washing mentioned in the bible is a Jewish tradition and it is purely symbolic. It is meant to merely wet the hands, which is useless for killing bacteria.

**Claim:** Matthew 5:18 KJV states, "*For verily I say unto you, Till heaven and earth pass, one jot or one tittle shall in no wise pass from the law, till all be fulfilled.*" And since Jesus fulfilled everything, the Old Testament no longer applies to Christians.

**Counters:**

- The bible is vague about the cutoff point of the law. It mentions the passing of earth, but earth is still here. Also, what did he mean by "all [being] fulfilled"? All of his prophecies? All of the prophecies in Revelations? All of the prophecies in the Old Testament?
- The bible is vague about the "law" Jesus is describing. Does he mean Jewish law? The new laws Jesus created? Laws of the country or state? Laws of nature?
- Assuming that Jesus meant the Jewish laws, then all 613 of Moses' laws would be considered null and void to Christians. If this is the case, why do Christians still hold to the ten commandments? Why do they still quote Leviticus? Why do they still circumcise male babies? Why haven't large sections of the Old Testament been removed from the Christian bible entirely?

**Claim:** The bible makes many predictions, and they have either come true as predicted, or will come true before Armageddon.
**Counter:** Several predictions made in the bible did not come or can no longer come true. See *Table 3.1.3 F* for examples.

### *3.1.2 F - Unfulfilled Prophecy In the Bible*

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| In **Genesis 26:4**, God explains to Abraham that his children shall increase to the number of stars in the heavens. If this is to be taken literally, it would imply that there should be around $4\times10^{22}$ Jews in the world. That number is obscenely large. Even if Jews birthed a billion people every year (far beyond the capacity the Earth could hold), it would still take 4,000 billion more years to reach that number. Life on Earth will be destroyed from our sun going red giant long before that. If it is to be taken poetically, why can't the rest of Genesis be taken poetically? |
| In **Isaiah 17:1**, God says that Damascus will be destroyed, but Damascus still stands to this day as the capital and largest city of Syria. |
| In **Isiah 16:5**, God says that he will dry up the river of the Egyptians (the Nile), but the Nile is still flowing to this day as the longest single river in the world. |
| **Isiah 52:1** states that no uncircumcised men will enter Jerusalem, but there are uncircumcised men living there to this day. |
| **Ezekiel 26** explains how Nebuchadnezzar will destroy the city of Tyre (Tyrus), but Tyre didn't fall until from the armies of Alexander the Great, hundreds of years after Nebuchadnezzar died. |
| In **Ezekiel 29:9-11**, God says that the entire region of Egypt will be desolate and that nobody will live there for 40 years, but Egypt has always been inhabited. |

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| In **Amos 9:15**, God says that the Jews will be planted upon their land and will never again be pulled out. Yet, the supposed land of the Jews has exchanged ownership many times since then, it currently is not under the control of the Jews, and it is still being fought over. |
| In **Matthew 24**, Jesus offers numerous prophecies before the end of time, and then in **Matthew 24:34** he says that the current generation will not pass away before all of his predictions have been fulfilled. In the bible's time line, Jesus spoke these words around 30 CE. About 2,000 years have past and that generation is long gone and many of his predictions (especially the one about the end of the world) have not happened. |

### *Scripture to Defuse a Christian*

People can become very upset when debating Christianity, and occasionally violent. If a Christian is verbally or physically attacking you. it's important to remember some passages from the bible to use against them. See *Table 3.1.2 F.*

*Table 3.1.2 G - Scripture to Defuse a Christian*

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| "*Judge not, that ye be not judged.*" (Matthew 7:1 KJV) |
| "*But I say unto you which hear, Love your enemies, do good to them which hate you, bless them that curse you, and pray for them which despitefully use you. And unto him that smiteth thee on the one cheek offer also the other; and him that taketh away thy cloak forbid not to take thy coat also. Give to every man that asketh of thee; and of him that taketh away thy goods ask them not again. And as ye would that men should do to you, do ye also to them likewise.*" (Luke 6:27-31 KJV) |
| "*So when they continued asking him, he lifted up himself, and said unto them, He that is without sin among you, let him first cast a stone at her.*" (John 8:7 KJV) |
| "*Dearly beloved, avenge not yourselves, but rather give place unto wrath: for it is written, Vengeance is mine; I will repay, saith the Lord.*" (Romans 12:19 KJV) |

# 3.1.2.1 – Adam and Eve

The story of Adam and Eve is dictated in the book of Genesis taken from the Torah. It recounts the tale of God creating Adam, then taking a rib from him to create Eve. They lived in the Garden of Eden (*Eden* is Hebrew for "delight") in

harmony with all the animals. Because death didn't exist at this time, many Evangelical Christians claim that all of the animals in Eden, even lions and tigers, were vegetarians and that extinct animals like dinosaurs and dodo birds lived in Eden as well. In the garden, God allowed Adam and Eve to eat from all of the plants, except for the Tree of Knowledge of Good and Evil and the Tree of Life. However, a talking serpent convinced Eve to eat from the tree of Knowledge and she, in turn, convinced Adam. This opened their eyes and they gained an understanding of good and evil. God punished them for their disobedience and permanently cursed all of their offspring with Original Sin.

## *Claims*

**Claim:** The account of Adam and Eve is a true story.
**Counter:** The story contains so many fantastic ideas (a talking snake, a garden of paradise, cherubs, a tree that grants immortality, lions who don't eat meat, a sentient flaming sword, etc.) that it is obviously a fairytale meant to be allegorical in nature.

**Claim:** Adam and Eve were the first humans. Everyone on earth is a descendant of them.
**Counters:**

- Modern genetics shows this to be impossible. A family with offspring based purely on incest would be ripe with recessive genes causing no end of mutations and abnormalities.
- After Cain kills Abel and is branded by God he leaves them and goes to the city of Nod. There among the people he meets a woman who becomes his wife. But if Adam and Eve were the first people on Earth, how could Cain, their first born, travel to a city full of people? How could these people be descendants of Adam and Eve?

**Claim:** Modern genetics shows that all people are descendant from a single male and female just as the bible states. Scientists even call this first couple Adam and Eve.
**Counter:** The people referred to here are known as Mitochondrial Eve and Y-chromosomal Adam. They were so-named because of the familiarity of their namesake, but they do not represent the story of Adam and Eve for the following reasons:

- The bible claims that Adam and Eve lived only about 6000 years ago, but Mitochondrial Eve and Y-chromosomal Adam lived more like 100,000 years ago.
- There is a gap of about 30,000 years between the life of Mitochondrial Eve and Y-chromosomal Adam, or about 1,000 generations. They lived in completely different times and in different areas of Africa. Thus, they never would have had children together.

- Mitochondrial Eve and Y-chromosomal Adam are matrilineal and patrilineal ancestors. This means that their lineage is only traceable along the lines of the mothers for matrilineal and fathers for patrilineal, but not both.
- Neither ancestor implies a bottleneck in population or a single person starting point. The most likely solution is that Mitochondrial Eve and Y-chromosomal Adam lived in their respective societies with many other people, however, theirs is the only genetic markers to find its way into all of today's people. Other ancestors probably still have surviving children, but theirs didn't span the entire globe.

**Claim:** The Garden of Eden was a real place on Earth.
**Counter:** Genesis 2:10-14 KJV locates the Garden of Eden in the Middle East near the Tigris and Euphrates rivers. Genesis 3:24 KJV says that when God banished Adam and Eve from the garden he sent Cherubims and a flaming sword to prevent people from entering the garden. However, explorers have covered every inch of the Middle East (along with the rest of the planet) and have not found a garden of paradise or a place where Cherubim prevent us from entering.

**Claim:** The Tree of Knowledge of Good and Evil and the Tree of Life are real trees.
**Counter:** Botanists have identified many different species of trees, but they have yet to find a tree whose fruit grants the eater knowledge or immortality. Also, they have never found a tree guarded by a flaming sword or cherubim.

**Claim:** Adam and Eve is a good story that teaches the moral of obedience.
**Counters:** Adam and Eve is a terribly immoral story with a negative message.

- God creates a forbidden fruit whose only purpose, it seems, is to damn Adam and Eve. God lies to Adam and Eve and says that if they eat the fruit they will die.
- However, God did not give Adam and Eve the ability to know right from wrong, so how could Adam and Eve know that disobeying God was wrong?
- A supposedly all-good god creates an evil serpent, knowing full-well that it will temp Adam and Eve into eating the fruit.
- Even though Adam and Eve don't know right from wrong, God is still angered when they disobey him and eat the fruit.
- God doesn't merely punish Adam and Eve, but all their children for the rest of eternity, damning them to Hell for something as mundane as eating fruit.

**Claim:** The story of Adam and Eve is a Christian story.
**Counters:** It's a Jewish story first, but other cultures have similar stories which means that Adam and Eve is probably not even Jewish in origin:

- In Norse mythology, Odin, Vé, and Vili create the first two humans out of logs and call them Ask and Embla.

- In the Qur'an the first man and woman are Aadam and Hawwa. They are created by Allah in much the same way that Yahweh creates Adam and Eve. Aadam is given dominion over all the creatures, which he names. Hawwa is then created from Aadam's living body.
- The Australian Aborigines believe that the first man and woman were called Wurugag and Waramurungundi and they taught their children language.
- Tiki and Marikoriko are the first man and woman in mythology of the Māori people of New Zealand.
- Malakas and Maganda are the first man and woman in Philippines mythology.

**Claim:** Eve came from Adam's rib, and even to this day men have fewer ribs than women.
**Counter:** This is not true. Most humans, male and female, have the same number of ribs—12 pairs. However, the floating ribs (the lower ribs that don't attach to the sternum) sometimes vary, which makes the total rib count between 10-13 pairs. Yet, both men and women average the same number of ribs.

# 3.1.2.2 – Noah's Ark

Noah's Ark is a story found in the book of Genesis from the Torah. It explains how God was angered by the wickedness of the people that he created and decided to commit genocide through murdering every living thing on the planet by drowning them all in a flood. In the story, God plays favorites with a man named Noah and his family whom he gives plans on how to save his family. He commands them to build a large boat and then fill it with two (or seven) or every kind of animal. Once the Ark was completed and filled, it rained so much in 40 days that even the mountain tops were submerged in water and the flood stayed around for 150 days more. Everything on earth that wasn't in the ark was horribly drowned. In the end, Noah sends out doves, and one returns with an olive branch, showing that there is land once more.

## *Claims*

**Claim:** Noah's Ark is a Christian story.
**Counter:** The Christians took the story from the Jews, but regardless, the tale of a great flood exists in the mythology of many ancient cultures, several of which predate the Torah. Since the Sumerian story is the oldest known flood story, it can be assumed that all later flood stories are just re-tellings of it. Therefore, the early Jews stole the story and claimed it for their own.

- *Sumerian*: The Sumerian Eridu Genesis tablet (1,800 BCE) tells a story of how the gods are angered with humans and are going to destroy them all in a flood. Zu-ud-sura is warned about the flood and builds a boat in

which he places animals to repopulate the world after the flood. When the flood finally ends he releases the animals, and sows the seeds of life once more.

- *Akkadian*: The Atrahasis Epic (1,700 BCE) states that human overpopulation was the cause of the flood. The gods were annoyed by the noise humans made and sent a flood to kill them all. Only Atrahasis was spared by being warned to build a large boat for safety.
- *Babylonian*: The Epic of Gilgamesh was appended with a variant of the Atrahasis Epic around 700 BCE.
- *Chinese*: In the book *Shujing* (700 BCE), Emperor Yao was faced with the problem of a huge flood that would reach to the heavens, but Da Yu the Great is able to control the flood.
- *Hebrew*: The Hebrew tale of Noah's Ark was written around 500 BCE.

The following cultures also have flood myths, though their initial dates are unknown.

- *Lao*: In the Khun Borom myth, a god sends a flood to destroy the wicked inhabitant of the earth. Only three wise chieftains are spared.
- *Indian*: Matsya builds a boat to survive the great deluge and brings with him the seeds of life to repopulate the world.
- *Greek*: Zeus is angered by mortals and sends a great flood to kill everyone. Only Deucalion is warned and he and his wife build a large boat to survive the flood.
- Flood myths are also part of the culture of the Andaman Islanders, Indonesians, Australians, Ogygians, Norse, Irish, Finnish, Aztecs, Incans, Colombians, Mayans, Hopi, Caddo, Menominee, Mi'kmaq, and Polynesians.

**Claim:** The fact that so many other cultures have flood myths proves that Noah's Ark really happened.
**Counter:** Most flood myths are quite different from Noah's Ark and some don't include saving animals or even a vengeful god. Having multiple flood myths in history proves only that floods were dangerous to our early ancestors and many people experienced floods and told stories about them.
**Claim:** Genesis 6:4 says that there were giants on the Earth before the flood, and the bones of giant humans have been discovered.
**Counter:** The actual ancient Hebrew word used is *Nephilim*, but nobody knows what that word means. It is hinted at meaning heavenly beings, possibly from the folklore behind constellations like Orion, who have sex with mortal women. Biblical scholars liken them to the Greek Titans. Regardless, the alleged discovery of the bones of giants, like the Cardiff Giant, have been discovered to be hoaxes.

**Claim:** Two of each animal was put on the ark.
**Counter:** There is a contradiction in the bible. In Genesis 6:19 God commands Noah to bring two of each animal, but in Genesis 7:2 he commands Noah to

bring seven of every clean animal and bird and two of every unclean animal. Regardless, this is not a large enough gene pool to repopulate the world.

**Claim:** Noah collected all of the animals to put on the ark.
**Counters:**

- How could Noah possibly traverse the millions of miles necessary to collect animals from every continent on the planet? He would have to cross frozen tundras and iceberg filled waters to get both the polar bears of the Arctic and the penguins of Antarctica.
- Similarly, how did he get two of each of the millions of various insects throughout the world? And even more difficult, how was he able to determine their sex?
- Even if you assume that the animals made their way to Noah, you would still have to explain how they survived the multiple year journey through vastly different climates without the food sources of their natural habitats. How could a North American coyote swim the entire Atlantic and walk all the way across Europe to finally end up in the Middle East?
- Noah would have to have found a way to get all the aquatic life that only lives in fresh water onto aquariums on the ark as well. They couldn't exactly hop out of their lake and walk over the land to get to the ark.
- Most plants would have died from being submerged for that long, Noah would also have to have collected seeds for millions of different types of plants in order to regrow various ecosystems.

**Claim:** The animals were already near Noah because they didn't stray very far from Eden.
**Counter:** There are millions of different animal species and most of them are not suited well for life in the Middle East. Furthermore, there are no fossil records to show the life of all animals living together in Middle East, and there should be many of them because according to Creationists, floods are good creators of fossils.

**Claim:** The Ark was huge.
**Counters:**

- According to the bible (Genesis 6:15), the Ark was $300 \times 50 \times 30$ cubits, or 450,000 cubits$^3$ (a cubit if the length from the elbow to the fingertip). If you assume that a cubit is approximately 45 centimeters, then the Ark's volume is $135 \times 22.5 \times 13.5$ meters, or only 41,006 m$^3$—about half the size of a modern freighter.
- The ark was large, but it was nowhere near big enough to fit Noah, his family, their food, all the animals, and all the animal's food for over 100 days.
- The ark was much larger than any other boat of the day, and the engineering to make such a large boat during the time did not exist. A boat that size, at that time in history, would have been extremely unstable and nowhere near seaworthy.

**Claim:** The Ark also carried now extinct animals like dinosaurs.
**Counter:** There are over a million different extinct animals, many of which are larger than any modern land animal. Hundreds of extremely large reptiles and mammals existed including dinosaurs, mammoths, mastodons, giant sloths, beavers, cats, etc. There would be nowhere near enough room to fit just extinct animals, let alone all of the living ones them all.

**Claim:** The entire world was covered in water.
**Counters:**

- No geological evidence of a global flood exists. There is no global layer of sediment, no near-total extinction of nearly all modern life around 6,000 years ago—nothing to support the story.
- When you take into account all of the water from the oceans, lakes, rivers, underground water, clouds, and water vapor from the entire planet you have about 1,360,000,000 $km^3$ of water. The surface of the earth is about 510,072,000 $km^2$. That means that, even if the Earth were perfectly flat and no mountains had to be covered, there is only enough water on the planet to cover it in about 2½ meters of water, or about eight feet. That is hardly an impressive flood.
- If the flood did cover the tallest mountains (Mt. Everest is almost 9 km above sea level) it would require about 4,500,000,000 $km^3$ more water. Where did all this extra water come from? One idea is that is existed as a shell of vapor around the earth, although such an idea would violate the laws of physics. Even if there was a huge vapor shell that somehow converted into rain, where did all of the water go after the flood began to dry up? The Earth's gravity and lack of heat at high altitudes prevent clouds from leaving the Earth, so where did all this water disappear to?
- In order to rain enough to cover the world with about 9 km deep of water it would have to rain 225 m (740 ft) everywhere in the world each day for 40 days. That's half a foot of rain every second. There wouldn't be rain drops, there would be rain lakes. The resulting damage from the rain would be catastrophic, and the ark would be battered into splinters.

**Claim:** Noah, his family, and all the animals lived on the ark for 190 days.
**Counters:**

- Try to imagine the enormous staff of workers, feeders, handlers, and veterinarians that work with the animals at a zoo. Now imagine a zoo 100 times larger covering every single animal on Earth. How big of a workforce would be needed to run such a zoo? The bible claims that only eight people could do it.
- That many animals would produce multiple tons of droppings every day that would have to be brought up from the lower decks and thrown overboard. That is far too much waste for only eight people to deal with.
- The quality of boats during this time in history were very poor. They would constantly be taking on water and, without mechanical pumps that didn't exist at the time, the water would have to be brought up from the bottom and thrown overboard—far too much work for only eight people.

- How would the carnivores be fed for the 190 days if no extra animals were brought as their food?
- How would the eight passengers be able to control all the animals? How would they feed them? How would they prevent them from eating each other and fighting with each other?
- How could they keep the thousands of tons of food needed to feed the animals fresh? Refrigeration would be impossible for that length of time, but even with refrigeration, the food would still go bad after 190 days at sea. How did they get vitamin C to prevent rickets and scurvy? Did they bring soil and plant gardens as well?
- How could they even store all the needed food? Many animals have very specialized diets. Pandas only eat bamboo, aardvarks only eat insects, large cats only eat meat, koalas only eat eucalyptus, vampire bats only eat blood, etc. You can't just feed them all hay.

**Claim:** God would have brought the animals to Noah, God would have kept the animals from attacking each other, God would have given Noah special engineering skills, etc.
**Counter:** If God did all of these things for Noah, then what was the point of making him do all the rest of the stuff? Why didn't he just teleport Noah directly to Mt. Ararat along with a bunch of animals? Why bother with the flood at all? Why not just kill every human he didn't like?

**Claim:** Noah's ark landed on Mt. Ararat, and pieces of it have been discovered there along with various inexplicable phenomenon.
**Counter:** The bible doesn't say the ark landed on Mt. Ararat, but in the mountains of the kingdom of Ararat. "*And the ark rested in the seventh month, on the seventeenth day of the month, upon the mountains of Ararat.*" (Genesis 8:4 KJV). The bible doesn't say where the kingdom of Ararat was located, but most biblical scholars agree that the modern volcano that we now call Mt. Ararat is not the area mentioned in the bible.

**Claim:** After the flood, the animals left the ark and spread all over the world.
**Counters:**

- How could a complete world population of animals occur from just two or seven of a particular animal? Modern genetics shows that a gene pool that small would be ripe with recessive genes causing no end of genetic failures, most of which would severely shorten their lives.
- If all the unsaved animals were now dead and rotten after the flood, what did the carnivores eat after they were let off the ark?
- How could the animals have spread from Mt. Ararat to all the rest of the world in just 4,000 or so years? How did they get to the Americas? How did they get to islands like Australia, Madagascar, and the Philippines?

**Claim:** The tale of Noah's Ark shows God's mercy.
**Counter:** Noah's Ark is an awful story that shows God's barbarism. He is annoyed at the wickedness of the people of earth that he himself created.

Rather than use his omnipotence to make them good, he horribly murders all of them. And even though he supposedly has the power to kill them quick and painlessly, not harming other aspects of nature, he decides to kill them slowly by drowning them and also wipes out nearly every innocent animal and plant in the process. That act goes beyond the evils of Hitler, Stalin, and Mao combined.

# 3.1.2.3 – Bible Code

Bible code is the belief that hidden messages occur in the bible. According to the pioneer of the bible code, Michael Drosnin, these hidden messages can be found using computer software to extract letters at varying distances in various versions of the bible. Many Christians believe that they were placed there by God and have predictive power.

## *Claims*

**Claim:** The bible contains hidden messages that can be found with a computer program.
**Counters:**

- You can use the same computer program to find hidden messages of equal sounding importance in any book. The bible code is just a matter of trying billions and billions of possibilities until one of them seems to make sense.
- Mathematician David Thomas found the words "code" and "bogus" close together 60 times in Genesis alone. Doesn't this mean that the bible code is bogus?

**Claim:** Michael Drosnin once said, "*When my critics find a message about the assassination of a prime minister encrypted in Moby-Dick, I'll believe them.*"
**Counter:** Critic Brendan McKay promptly produced an analysis of Moby-Dick predicting not only Prime Minister Indira Ghandi's assassination, but the assassinations of Minister Martin Luther King, President John F. Kennedy, President Abraham Lincoln, Prime Minister Yitzhak Rabin, and the death of Diana, Princess of Wales.

**Claim:** The chances of finding a meaningful hidden message in the bible are millions-to-one, yet they occur all over the bible. This proves that the messages are divine in nature.
**Counter:** Although millions-to-one may sound impressive, remember that the computer program goes through billions and billions of possibilities to look for messages. When you take that into account millions-to-one odds are expected to happen quite often.

**Claim:** Since hidden words like "Hitler" and "Stalin" occur near evil dictators of the bible, you can use the hidden messages of the bible to predict the future.
**Counters:**

- This predictive power is just as flawed as the ones employed by psychics. "Predictive" means that you know something will happen *before* it happens, not after. Also, a prediction is useless if all it does is state a name or a place. Without giving a detailed explanation of what is going to occur, where it's going to occur, when it's going to occur, and who is going to do it, a prediction isn't falsifiable, and therefore, useless.
- David Thomas did an analysis on Drosnin's *Bible Code II: The Countdown* and found the message "The bible code is a silly, dumb, fake, false, evil, nasty, dismal fraud and snake-oil hoax."

# 3.1.3 - Jesus

Jesus is the primary prophet of Christianity. He was supposedly born from his mother Mary—a virgin who was impregnated by immaculate conception. His birth was supposedly foretold by biblical prophecy. During his life he allegedly performed miracles like raising the dead, healing the sick, driving out demons, and walking on water, among others. Jesus was tortured and crucified, and through his death humans are supposedly capable of having their sins forgiven.

## *Claims*

**Claim:** Jesus was conceived through immaculate conception.
**Counters:**

- A child born from a god is common theme in mythology including many that predate Christianity. It appears that Christianity took the idea for their own. Other alleged miraculous births include:
  - *Egyptian*: The virgin Mut-em-ua was told by the messenger Taht that she will conceive. Then, the god Kneph placed a cross to her mouth and impregnated her with Amenkept III. Upon his birth he was visited by three kings offering him gifts.
  - *Egyptian*: The god Ra was born from the virgin goddess Nut.
  - *Egyptian*: The god Horus was born from the virgin goddess Isis. Historians have made many correlations between Isis and Mary.
  - *Persian*: Mithra (worshiped in 600 BCE) was a god-child born of a virgin on December 25th; his birth was celebrated by magi bearing gifts; he traveled with 12 companions and performed miracles; he fed people sacred bread and wine; he encouraged purification through water (baptism); he was buried in a tomb and resurrected three days later near the spring equinox (Easter); Sunday is considered the day of Mithra.

- *Greek*: Perseus was was the son of the virgin Danaë who was impregnated by the god Zeus.
- *Greek*: Helen of Troy, Clytemnestra, and twins Castor and Pollux were all born from the virgin Leda who was impregnated by the god Zeus.
- *Greek*: Heracles was the child of the god Zeus and the mortal Amphitryon.
- *Indian*: Krishna was born of a virgin through a means of "mental intercourse" in 3228 BCE.
- *Roman*: Romulus and Remus are the twin sons of the virgin Rhea Silvia and the god Mars and born in 771 BCE.
- *Indian*: Siddhārtha Gautama, the first Buddah, appeared to his mother Maha Maya in a dream and she birthed him in 563 BCE.

- Only the gospels Matthew and Luke write about Jesus being born via immaculate conception, Mark and John don't mention it. It seems suspect that the editors of the gospels would leave in the boring details of walking from city to city, but leave out something as extraordinary as immaculate conception.
- This is a very extraordinary claim, and it seems much more likely that it was simply made up or that Jesus was simply the illegitimate child of Mary and Joseph who fabricated the story to avoid being stoned to death.

**Claim:** Jesus was born of a virgin fulfilling the prophecy in Isaiah 7:14.
**Counter:** The New Testament claims that Jesus was born of a virgin in Matthew 1:22-23. However, the Old Testament prophecy in Isaiah uses the ancient Hebrew word *alma* which best translates to "young lady". There is a specific Hebrew word for "virgin" and that is *baitula*. The book of Matthew is misquoting Isaiah.
**Claim:** If the Hebrew word *alma* doesn't mean "virgin", then why is it always used in the Old Testament to refer to virgins?
**Counter:** It's not. Proverbs 30:18-20 uses *alma* to refer to an adulterous young woman.

**Claim:** The eye-witness account of Jesus' life in the bible is accurate.
**Counters:**

- According to bible scholars, the account of Jesus' life in the Gospels wasn't written until over 100 years after he died. Anyone who was actually alive during his life was dead and couldn't corroborate the authenticity of the bible. Also, given such a large gap in time, and poor record keeping skills of the day, one can assume that any amount of changes would have occurred in the recount of his life.

- No other historical records from the time of Jesus' supposed life actually mention Jesus or any of the amazing miracles that he supposedly performed. Shouldn't these impressive miracles be found in nearly every historical account of the time? Even if the Romans tried to prevent these documents from being kept, surely some of them would have been preserved to this day.

**Claim:** C.S. Lewis's *Lunatic, Liar, or Lord* argument: Jesus was either the son of God, a liar, or lunatic. He wasn't a liar and his actions aren't that of a lunatic, so he must have been the son of God.

**Counters:**

- This flaw in logic is called a false dilemma. It assumes that Jesus can only be three possible choices, a liar, a lunatic, or the son of God. It ignores the other infinite possibilities like, the biblical account of Jesus is inaccurate, Jesus was misquoted, the authors of the bible confabulated Jesus' words, pious fraud led the bible's authors to alter it, the bible exaggerates the life of Jesus, Jesus' life is an amalgam of many other prophets, etc.
- Much of what Jesus said was crazy. See *Table 3.1.3 A*.
- It is impossible to show that Jesus wasn't a liar because almost thirty years of his life is omitted from the bible. Jesus could have became a pathological liar during that time.
- The gospels weren't written until over 100 years after Jesus supposedly died. How did a primitive culture, with almost no access to writing, maintain detailed records of his life for that long to accurately portray his life?

*Table 3.1.3 A - Examples of Jesus' Insanity*

| |
|---|
| **Jesus commands you to love your enemies.**<br><br>"*But I say unto you, Love your enemies, bless them that curse you, do good to them that hate you, and pray for them which despitefully use you, and persecute you.*" (Matthew 5:44 KJV)<br><br>"*But I say unto you which hear, Love your enemies, do good to them which hate you, Bless them that curse you, and pray for them which despitefully use you.*" (Luke 6:27-28 KJV)<br><br>No rational person will listen to Jesus because enemies are often violent, aggressive, or insane, and they will kill you and everyone you love. If the USA dissolved their military and loved Islamic extremists, those extremists would invade the country and murder everyone. |
| |

**Jesus commands you to sell everything you own.**

"*Lay not up for yourselves treasures upon earth…*" (Matthew 6:19 KJV)

"*…If thou wilt be perfect, go and sell that thou hast, and give to the poor, and thou shalt have treasure in heaven: and come and follow me.*" (Matthew 19:21 KJV)

"*Sell that ye have, and give alms.*" (Luke 12:33 KJV)

"*So likewise, whosoever he be of you that forsaketh not all that he hath, he cannot be my disciple.*" (Luke 14:33 KJV)

No rational person will listen to Jesus because if you gave all of your wealth to the poor, you wouldn't be able to survive in the world. You couldn't afford food, clothing, shelter, medical attention, etc. It's even comical to imagine everyone obeying Jesus; who would you give your money to? Everyone would be trying to give it to everyone else.

**Jesus commands you to hate your family.**

"*And every one that hath forsaken houses, or brethren, or sisters, or father, or mother, or wife, or children, or lands, for my name's sake, shall receive an hundredfold, and shall inherit everlasting life.*" (Matthew 19:29 KJV)

"*If any man come to me, and hate not his father, and mother, and wife, and children, and brethren, and sisters, yea, and his own life also, he cannot be my disciple.*" (Luke 14:26 KJV)

No rational person will listen to Jesus because our families love us and we love them for everything that we've done for each other. How can Jesus tell us to love our enemies and, in the same breath, hate our families? It's insane.

**Jesus commands us to maim ourselves.**

"*And if thy right eye offend thee, pluck it out, and cast it from thee… And if thy right hand offend thee, cut it off, and cast it from thee: for it is profitable for thee that one of thy members should perish, and not that thy whole body should be cast into hell.*" (Matthew 5:29-30 KJV)

No rational person will listen to Jesus and gouge out their eye or cut off their hand because they know that the mere act of cutting off a body part won't stop you from sinning. This is both insane and masochistic.

**Jesus says poison won't harm you.**

"*They shall take up serpents; and if they drink any deadly thing, it shall not hurt them…*" (Mark 16:18 KJV)

No rational person will listen to Jesus because they know that getting bit by venomous snakes and drinking poison will kill them. This is suicidal.

**Claim:** Jesus preformed many miracles.
**Counter:** It is much more likely that Jesus didn't perform any miracles, and the authors of the bible fabricated the miracles. However, even if we assume that the bible is fairly accurate, most of the miracles of Jesus aren't very impressive. They can easily be explained by either a lack of understanding of medicine, chemistry, and technology, or simple parlor tricks like sleight of hand.

**Claim:** The miracles that Jesus performed were righteous.
**Counter:** Jesus squandered his miracles. If he really had godly powers he could have rid the world of disease, hunger, and poverty. Instead he turned water into wine so that people could get drunk (John 2:9 KJV) and cursed a fig tree because it didn't produce fruit out of season (Matthew 21:19 KJV). These are hardly righteous miracles.

# 3.1.4 - Creationism

Creationism is the religious belief that the universe was created by God. Creation science is an attempt to find scientific data to help prove Creationism and disprove well-established scientific fact. Intelligent Design is a modern name for Creation science where the only difference is that it doesn't specifically mention the Christian God so that it will be more attractive to secular people. The term "Intelligent Design" (ID) is still only well-known in the USA where most of the proponents of ID live.

## *Age of the Earth Claims*

**Claim:** The universe and the Earth are only around 6,000 years old.
**Counters:**

- All cosmological methods for dating show that the universe is around 13.7 billion years old.
- All geologic dating shows that the Earth is around 4.5 billion years old.
- The oldest fossils of life on Earth are around 3-3.4 billion years old.
- The oldest *Homo sapiens* remains are about 200,000 years old.

**Claim:** The oldest living thing on earth is the bristlecone pine tree which is about 4,900 years old, indicating a young earth.
**Counters:**

- Dendrochronology (the study of tree ring samples) of bristlecone pines, compared to older, dead trees, provide botanists with a record over 10,000 years. Additionally, the samples show no evidence of a global flood.
- The oldest plant, the King Clone creosote bush in the Mojave Desert, is measured by botanists to be around 11,700 years old.

**Claim:** Writing seems to have sprung up only a few thousand years ago which is consistent with a young Earth.
**Counter:** Writing wasn't necessary to a hunter/gather tribe. It wasn't until the advent of agriculture (a few thousand years ago) that record keeping (i.e., writing) became important.

**Claim:** The oldest languages are very complex, if evolution is true, how could humans have just started with complex languages?
**Counter:** All languages prior to the advent of writing are lost in time, but the earliest forms of writing (cuneiforms and glyphs) are quite primitive. They lack the form of modern languages like spaces, punctuation, a grammatical structure.

**Claim:** If the earth is really billions of years old there should be tons of excess dust on the planet from meteors.
**Counter:** The dust equations used by Creationists are based on an old faulty test. Most recent tests, including one performed by P. Gabrielli in 2004 and published in *Nature*, show dust accumulation consistent to what we see today.

**Claim:** If the moon is really billions of years old there should be tons of excess dust on it. In fact, prior to the moon landings, NASA was concerned that the lunar lander would sink into several meters of dust.
**Counter:** The dust amount comes from an obsolete faulty test. Also, NASA never made such a claim and was quite sure that due to the optical properties of the moon's surface, the dust wasn't very deep. Surveyor I, in May 1966, confirmed this.
**Claim:** The speed of light used to be a lot faster and has been slowing since the universe was created. That is why the universe appears to be older than it is.
**Counter:** This claim is based on the work of physicists Albrecht and Magueijo who posit that during the inflation period of the big bang theory, light traveled much faster than it does now. However, their theory (or any others regarding the change in the speed of light) has not been verified by observation. Also, even if the speed of light did change during the inflation period, it wouldn't matter because the inflation period of the big bang was was only $10^{-43}$ seconds, not long enough to create a noticeable change, and the inflation period occurred prior to the formation of most cosmic events we use to measure the age of the universe.

## *Design Claims*

See *1.2.3 - Evolution* for more claims.

**Claim:** Design is obvious in human biology.
**Counter:** If the human body was designed, it was designed very poorly. In fact, the amount of vestigial organs and similarities to prior species helps prove evolution. Humans obviously function well enough to thrive on the planet with their poorly constructed bodies, but this claim is not that they function, but that they function so well they must have been designed. Serious flaws in human construction include:

- Our optic nerve sits in front of our retina causing a blind spot and loss of clarity in each eye. It also has poor circulation, poor color depth, and views everything upside down. Our eyes should have been designed like octopus eyes which don't have any of these problems.
- We eat and breathe from the same orifice which makes choking and drowning very common. Our esophagus should have been designed like dolphins who don't have this problem.
- Our urethra is used both for waste removal and reproduction which makes it prone to infection. Our waste removal should have been designed like birds who don't have this problem.
- The human appendix is undersized and useless, it only creates problems by becoming inflamed and possibly killing us. However, it would be useful to our ancestors who ate lots of leaves.
- Our tail bone serves no purpose and it is extremely painful if it breaks. Some people are even still born with vestigial tails. However, a tail would have been useful to our ancestors who lived in trees.
- The soft disc material in our spines is poorly constructed for upright walking and causes no end of pain and suffering to humans as they age. However, if our ancestors walked on all-fours, it is constructed just fine.
- We have too many teeth for our mouths. When our wisdom teeth come in they usually push our other teeth into each other causing many dental problems. However, extra teeth would be very useful to our ancestors who had heavy plant diets.
- Our teeth are incredibly weak, often breaking down and falling out long before old age, especially before science improved dentistry. We should have been designed like sharks who grow new teeth their whole life and don't have this problem.
- Our necks are incredibly frail and under-protected for housing our important biology. Our necks should be designed like dog's who don't have these problems.
- Humans must ingest vitamin C to survive while most other animals convert simple sugars into vitamin C using four enzymes. Humans, have all four necessary enzymes, however, enzyme L-gulonolactone oxidase is defective because it has mutated.

- 80%-95% of our DNA is junk DNA that doesn't have any effect on our genetics at all. This makes sense if we evolved from other species.
- Male primates have nipples that they'll never use. A designer wouldn't have put them there.
- Humans have genes for creating gills and notochords like those seen on early fish. We don't use them, but occasionally they cause birth defects like branchial cleft cysts and chordoma tumors. Why would a designer give us primitive fish genes that serve no purpose?
- The female pelvis birth canal is often too small for their baby's head to pass through easily. Without modern cesarean sections both mother and child often die. A designer would have made it larger.
- Human gestation is very short and babies are helpless for many years after they're born. We should have been designed like horses or cows who are born mostly functional.
- Our umbilical cords attach at our bellies, which is inefficient. They should have been designed to attach at the chest which would be better for circulation without hindering the supply of nutrients causing fewer developmental complications.
- Sex between humans is horribly ineffective. Compared to other animals, sex between humans takes a huge amount of time and energy. Millions of sperm enter a woman's body during copulation, but they are rarely able to fertilize an ova. Also, there is no obvious way to tell when a woman is ovulating, like with many other mammals. Even if fertilization occurs, early miscarriages are very common in humans.
- Fetal development grows two primitive sets of kidneys before growing the third set that we keep through our lives. The first two are similar to what fish and amphibians have, which makes sense if our ancestors started as fish, then evolved into amphibians, and then evolved into mammals.
- Humans can't regrow their limbs the way that many reptiles and amphibians can, even though it would be perfectly plausible for us to do so—and certainly beneficial.
- The Odontoid Process, a bony extension of the C2 vertebral body, can easily fracture leading to death or paralysis of all extremities. A simple rotatory ball-socket joint would have been a better and safer design.
- The immune system often rampages out of control from various autoimmune diseases attacking healthy cells that are supposed to be in the body. This makes sense if the immune system evolved from a separate organisms, but why wouldn't an intelligent designer not give the immune system the ability discern good cells from bad?
- 99% of all species that have ever existed on Earth are extinct. This is a very poor track record for an infallible creator, but expected in an evolutionary model.
- The superior laryngeal of the vagus nerve is inefficiently setup. Instead of going from the brainstem to the larynx, it loops from the brainstem, all the way down to the aorta, and back up to the larynx. This useless round trip makes sense if humans evolved from a common ancestor with

fish, but there is no reason why a creator would ever design nerves this way.

- Female ovaries are disconnected from the uterus by the fallopian tubes. This is problematic because ova have a long path to the uterus, and is often the cause of miscarriages. Shorter fallopian tubes would be more efficient.

**Claim:** Design is obvious in the cosmos.
**Counter:** Just like there are many flaws in the construction of the human body, so too are there many flaws in the cosmos if it were supposedly designed with us in mind.

- Nearly everything in the universe will kill us: Empty space is extremely cold, has no air to breathe, and no gravity to sustain us; any place near a star has too much radiation, heat, and magnetic strength for us to live; even most places here on the planet are extremely dangerous. The bottom of the oceans have too much pressure; the stratosphere has too little; volcanoes, earthquakes, hurricanes, and tornadoes constantly bombard us. In fact, nearly every form of matter and energy in the universe, even in small amounts, will kill us. It would be a better argument to claim that the universe was designed to kill us.
- We are just one of billions and billions of other planets in the universe. There doesn't appear to be anything special about our planet. We're probably not even the only one with life on it.
- Gravity is extremely powerful and causes people to die from falling all the time. If the universe was created with us in mind, gravity would be weak enough to allow us to gently glide back to the ground.

**Claim:** The laws of physics are so precise and fine-tuned that the universe and life on Earth must have been created. The speed of light, strength of gravity, strength of the weak and strong atomic forces, position of the Earth relative to the sun, rotation speed of Earth, and many other variables are perfectly situated for life; even slight changes to any of them would end life as we know it on Earth.
**Counters:**

- Actually, several aspects of the planet including, rotation speed, distance from the sun, and orbital speed could be quite different and life could still exist on Earth.
- Implausibility does not demand divinity. It may seem implausible for the laws of physics to allow the creation of life in hindsight, but most things seem implausible in hindsight. For example, if you shuffle up a deck of cards and deal out all 52, the chances of you dealing out the exact same order you just dealt is $8 \times 10^{67}$ to 1. However, it would be foolish to assume that only divine intervention could allow you that deal. The odds of something happening, that has already happened, are always 1 to 1.
- This argument assumes that the universe must behave according to the laws of physics. If God truly were omnipotent, he should be able to make a universe that defies the laws of physics, yet this isn't the case.

**Claim:** *Watchmaker Analogy*—Just like a person in a desert who has never seen a watch would know it has a creator because of its complexity, a person can know that the universe has a creator because it's so complex.
**Counters:**

- In this example, the watch is assumed to be created because it is compared to the desert that surrounds the watch. When looking at the universe, what comparison can be made? There is only one. How could someone tell that the universe is complex when there isn't a backdrop like the desert to compare it to? If you saw a pile of watches you wouldn't pull one out and say that that specific one was created, but the others were not.
- A watch has an obvious use which helps explain its design. The universe, however, has no apparent use or purpose.

## *Intelligent Design Claims*

**Claim:** Intelligent Design is not Creationism or religious.
**Counters:**

- Intelligent Design (ID) has the same agenda as Creationism. The only difference is that the word "God" is replaced with "intelligent designer". However, most ID advocates are Christian, and most of them admit that God is their intelligent designer.
- The Discovery Institute, one of the largest supporters of ID, authored the *Wedge* document, which talks about using ID as a wedge to "*defeat scientific materialism*" represented by evolution, "*reverse the stifling materialist world view and replace it with a science consonant with Christian and theistic convictions*" and to "*affirm the reality of God.*"
- An early draft of the ID textbook *Of Pandas and People* contains many references to Creationism. Later revisions merely renamed the instances of Creationism to ID, showing that ID literally is just Creationism renamed. In fact, one instance the word "creationists" was only half-altered to read "cdesign proponentsists".
- In the 2005 Kitzmiller v. Dover Area School District, Judge John E. Jones III ruled that, "*Accordingly, we find that the secular purposes claimed by the [ID promoting school] Board amount to a pretext for the Board's real purpose, which was to promote religion in the public school classroom, in violation of the Establishment Clause.*"

**Claim:** Intelligent Design is a theory, just like evolution.
**Counters:**

- Intelligent Design is not a theory. Theories must be based on evidence, but ID doesn't offer any evidence for an intelligent designer, it merely tries to point out flaws in the evidence for evolution. Theories must be testable and falsifiable, but God or an intelligent designer, according to Christians, cannot be tested or disproved. Theories must also offer

predictions and give new avenues of discovery, which ID also fails to do. ID also includes supernatural causes, which, by definition, prevents it from being science at all, let alone a scientific theory. ID and Creationism are useless from a scientific standpoint.

- In Kitzmiller v. Dover Area School District, Judge John E. Jones III ruled that ID was in fact religious in nature by stating, "*After a searching review of the record and applicable caselaw, we find that while ID arguments may be true, a proposition on which the Court takes no position, ID is not science. We find that ID fails on three different levels, any one of which is sufficient to preclude a determination that ID is science. They are: (1) ID violates the centuries-old ground rules of science by invoking and permitting supernatural causation; (2) the argument of irreducible complexity, central to ID, employs the same flawed and illogical contrived dualism that doomed creation science in the 1980's; and (3) ID's negative attacks on evolution have been refuted by the scientific community.*"

**Claim:** The theory of Intelligent Design should be taught along side evolution as biology.

**Counters:**

- ID is based on God, or at the very least, a supernatural creator, therefore making it religious. Teaching religion in public schools violates the Establishment Clause of the first amendment of the US Constitution.
- ID is not science nor is it a theory. If it is to be taught in schools it should be taught in theology class since it is a theological idea.
- Just because you can get a group of laypeople to call something science doesn't mean that is a science. Science class is meant to teach objective empirical studies, not superstitions. Should we also start teaching students that the sun orbits the Earth or that the Earth is flat, the same way that Christianity did centuries ago (and occasionally still do)? These theories were evaluated by scientists and found to contradict the evidence, and were thus discarded. Creationism and ID have been discarded for similar reasons.

**Claim:** The controversy between evolution and Intelligent Design should be taught in school.

**Counters:**

- This supposed controversy does not exist in the scientific community. Very few scientists believe in ID, and even fewer scientists who specialize in cosmology, geology, and biology believe it (See *Table 1.2.3 A*). The ID/evolution controversy only exists in the non-academic social community. The conflict may be taught in sociology or theology classes, but there is no reason to teach it in a science class.
- Judge John E. Jones III ruled in the Kitzmiller v. Dover Area School District trial that, "*ID's backers have sought to avoid the scientific scrutiny which we have now determined that it cannot withstand by advocating that the controversy, but not ID itself, should be taught in*

*science class. This tactic is at best disingenuous, and at worst a canard. The goal of the IDM is not to encourage critical thought, but to foment a revolution which would supplant evolutionary theory with ID.*"

**Claim:** Evolutionists are afraid to debate ID in a public setting.
**Counter:** Debates are useless to science. They don't accomplish anything other than to show who is better at debating. Unlike ID's strategy of simply denying everything, science is far too complex to be explained in the short time constraints of a debate. When a person takes the time to educate themself on the intricacies of all the areas in science involved in evolution including biology, geology, cosmology, chemistry, etc. then they will understand why the evidence for evolution is so incredibly strong.

## *Fossil Claims*

See *1.2.4 - Fossil Evidence* for more claims.

**Claim:** Dinosaurs lived alongside humans prior to the flood.
**Counters:** If humans and dinosaurs lived during the same time period, their fossils should date around the same time and their remains should be in the same levels of strata. However, dinosaur fossils always date millions of years older than human remains and are always found many levels of strata deeper than human fossils.
**Claim:** The bible makes references to dinosaurs as "behemoth" and "leviathan", in Job 40:15-24 and 41:1-10, proving that they existed recently.
**Counter:** Most biblical scholars believe that the behemoth mentioned in Job is an elephant or a hippopotamus and the leviathan is probably a whale or a crocodile. Regardless, the description of the animals is poetic, not technical, and could refer to any number of animals. If you take the description literally you should also believe in unicorns, satyrs, fiery flying serpents, dragons, and talking donkeys, all of which are also mentioned. See *Table 3.1.2 D*.

**Claim:** Some dinosaur tracks in the Paluxy River bed in the Dinosaur Valley State Park, Texas, have human footprints in them.
**Counter:** Excluding the obvious forgeries made recently by vandals with chisels, the supposed human footprints look very little like human footprints at all. Although the general shape resembles an oblong indent, there are no toe indentations and the prints are at odd angles, meaning that the toe-less person would also have to be walking cross-legged. The plaster molds made that look just like feet are obvious forgeries.

## *Other Claims*

**Claim:** God created the universe in six days and rested on the seventh (Genesis 1:3-2:3).
**Counter:** Why would God spend six days creating the universe? If he's all-powerful, why didn't he just create the entire universe instantly? Why spread out the time? And why did he rest on the seventh? Did working tire out an all-powerful creator? It seems far more likely that humans, who had already developed a tradition of six work days and a day of rest, attributed the week to creation because it was familiar to them.

**Claim:** The story of creation as seen in Genesis 1 is a Christian story.
**Counter:** A very similar creation account called "Enûma Eliš" exists in Babylonian mythology which is most likely where the Hebrew story of creation came from. The oldest known tablets that contain the story date to about 700 BCE, but historians claim that the story probably became popular at around 1800 BCE. The book of Genesis was probably written around 500 BCE.

**Claim:** NASA scientists, using computers to track planetary motions, discovered that a day of time was missing, corresponding to biblical accounts of the sun's standing still for Joshua for almost a day, plus the sun moving backwards forty minutes for Hezekiah.
**Counter:** The origin of this urban legend goes back to 1890 and it is entirely baseless. There is no frame of reference to measure against to determine whether a day was missing thousands of years ago.

**Claim:** Many great scientists like Babbage, Boyle, Brahe, Copernicus, Da Vinci, Faraday, Galilei, Herschel, Kelvin, Kepler, Linnaeus, Maxwell, Newton, Pascal, and Pasteur were all Creationists.
**Counter:** Most of them were Creationists by default because no other scientific theories for the origin of the universe had been conceived. All of these men were dead long before the big bang theory was thought up in the early 1900s, most of them were dead before any real work was done on the theory of abiogenesis, and most of them were dead before Darwin published the theory of evolution. Also, several of these people had little expertise in cosmology or biology focusing more on mathematics, physics, and chemistry.

# 3.1.5 - Prayer

Prayer is very important to Christianity. Most Christians view prayer as a way to communicate and have fellowship with God. Prayer is used for many occasions including thanking God and asking for healing, guidance, and wisdom. Many prayers, like the Lord's Prayer (Matthew 6:9-13), are taken directly from the bible; others are a conglomerate of verses that have been modified, like the Hail Mary (Luke 1:28, 1:42); some are created by religious

groups like the Act of Contrition; while others are entirely ad libbed. Christian prayers traditionally end with *amen*, which is Hebrew for, "so be it".

### *Claims*

**Claim:** Prayer has been proven effective in healing sick people.
**Counters:** Properly conducted randomized double-blind tests have shown that prayer is not effective at healing sick people. These tests include:

- In 2001, a double-blind randomized controlled study at the Mayo Clinic also showed that prayer had no effect compared to the control group.
- A 2005 study at Duke University called MANTRA used a double-blind test of prayer on heart surgery patients. It resulted in no statistical significance between the prayer group and the control group.
- A different type of study in 2005 compared three groups. Group 1 was told that they might receive prayer and did, group 2 was told they might receive prayer and didn't, group 3 was told that they will receive prayer and did. In the end, the only difference was that group 3 had a slightly higher number of complications. Showing that the effect of prayer was a placebo.
- A similar study published in the American Heart Journal in 2006 of two groups, one double-blind receiving prayer, the other openly receiving prayer, showed that those openly receiving prayer had a slightly faster healing time. This is the expected result of the placebo effect.

**Claim:** Prayer should be allowed in school.
**Counter:** Prayer is allowed in school. The first amendment of the US Constitution allows the freedom of religion, but the Establishment Clause of the first amendment also prevents government institutions from endorsing or promoting religion which is why teachers and administrators cannot lead their class in prayer. However, students are still allowed to pray and individually and in groups if they so choose.

# 3.1.6 – Man

Although Christianity is a very patriarchal religion which places men above women (women are consider property in the bible), it also places humans, in general, above all other living things. Christians claim that humans are unique and different from animals, that they have a soul and a dignity that comes from being made in God's image. However, modern science shows us that the only real difference between humans and other animals is that we're slightly more intelligent.

## *Claims*

**Claim:** Animals are not self-aware.
**Counter:** This, of course, depends on your criteria for being self-aware, but the *de facto* standard for checking if an animal is self-aware is to put it in front of a mirror and analyze its actions to see if it recognizes itself. Currently, the following animals pass the mirror self-aware test: humans, bonobos, chimpanzees, orangutans, gorillas, bottlenosed dolphins, orcas, elephants, and European magpies.

**Claim:** Only humans use tools.
**Counter:** Many of the more intelligent animals use tools.

- Primates are the biggest tool users. They use sticks to fish for insects, logs and rocks to crack open nuts, and sticks to measure the depth of water.
- Otters use stones to crack open clam shells.
- Several birds use stones to crack open seeds and eggs and fish for insects.
- Straited Herons will drop items into the water to act as bait to catch fish.
- Bottlenose dolphins use pieces of sea sponge to protect their noses.
- Elephants use branches to swat at flies, and drop rocks on electric fences to disable them.

**Claim:** Animals may use tools, but only humans make them.
**Counters:** Several animals make their own tools as well.

- Various primates will sharpen sticks to make spears for hunting,
- Elephants create water storage containers by digging a drinking hole, filling it with chewed bark to gather moisture, covering it up to prevent evaporation, and then returning to it later for a drink.

**Claim:** Only humans are capable of acts of evil like deceit, rape, or murder because of our freewill. Animals are merely beasts and are not capable of such things.
**Counter:** Many animals exhibit actions equivalent to murder, rape, and deceit.

- Lions, tigers, and wolves will all murder the males of other packs who encroach on their marked territory.
- Many apes gang-rape females.
- Male lions, when taking over a new pack, will kill all the existing children so that they may re-impregnate the females so that only their offspring will live.
- Male wolves will often kill their own children so that they won't be competition for pack dominance.
- Sharks, beetles, snakes, opossums, and spiders use deceit to "play dead" to avoid predators.
- Plovers are birds that use deceit to make predators believe they have a broken wing to try and entice them away from their nests.

**Claim:** Only humans are capable of speech.
**Counter:** Many animals can be taught to communicate in various ways. The only reason they cannot speak is because they don't have the necessary larynx. Yet the following animals are capable of communication:

- Primates are capable of learning sign language. The chimpanzee Nim Chimpsky learned about 125 signs, the chimpanzee Washoe understood about 250 signs, the bonobo Kanzi understood close to 400 signs, and the gorilla Koko knew about 1,000 signs and could comprehend about 2,000 human words.
- Many birds are able to mimic human speech, but several are able to use the language more accurately and even form sentences. Alex, an African Grey, understood about 150 words, while N'kisi had a vocabulary of over 900 words.

# 3.1.7 - USA

Many Christians claim that the United States of America is a "Christian Nation" because it was founded by Christians and that its system of government was based on the morals of Christianity.

## *Claims About the Founding Fathers*

**Claim:** The founding fathers of the USA were moral Christians.
**Counters:** While the founding fathers were indeed capable politicians who drafted a well-functioning government, they were hardly paragons of virtue.

- All of them were staunch racists. They prevented black people and Native Americans from voting or owning land. Millions of innocent black people and Native Americans were enslaved, treated as property, exploited for money, tortured, and ultimately killed. Native Americans were continuously cheated out of their land, raped, abused, and the target of genocide. At the very least, our founding fathers turned a blind eye to these actions, but more commonly, they actively participated in creating laws to continue these practices.
- All of them were sexist. They would not allow women to vote, own property, or hold office. Many of them had mistresses with whom they cheated on their wives. Some of them even raped their female slaves and sired illegitimate children through them.
- Many of them were abusers of alcohol, and other drugs.

**Claim:** The United States was founded on Christian values because the founding fathers were Christians.

**Counters:**

- Most historians agree that most of the founding fathers were Unitarians and Deists. A Unitarian doesn't believe in Trinity (i.e., that Jesus was Christ). A Deist is someone who believes in God, but uses reason in their life, thus not believing in biblical fundamentalism or literalism.
- The religious views of our founding fathers are irrelevant. Our country is a democracy that respects the values of minorities and views all people as equal.
- Our founding fathers were also all slave owners and misogynists. Not everything they did was ethical.

**Claim:** George Washington was a Christian.
**Counters:**

- Washington was a Christian, but probably not a fundamentalist. He attended church regularly, but he wrote and spoke very little regarding his personal religious views.
- The *Treaty of Tripoli*, declares that "*the government of the United States is not, in any sense, founded on the Christian religion."* This treaty was written under George Washington's presidency.

**Claim:** Thomas Jefferson was a Christian.
**Counters:**

- Jefferson's views were very different from that of the conventional church and he considered himself to be in a sect with just one member: himself.
- Jefferson wrote in his letter to Peter Carr, "*Question with boldness even the existence of a God; because, if there be one, he must more approve of the homage of reason, than that of blind-folded fear.*" He also wrote, "*Do not be frightened from this inquiry by any fear of its consequences. If it ends in a belief that there is no God, you will find incitements to virtue in the comfort and pleasantness you feel in its exercise, and the love of others which it will procure you.*"
- Jefferson fought to keep the state of Virgina from being able to use taxes to fund churches.
- Jefferson's *Bill of Religious Freedom* reads: "*No man shall be compelled to frequent or support any religious worship, place, or ministry whatsoever, nor shall be enforced, restrained, molested, or burdened in his body or goods, nor shall otherwise suffer, on account of his religious opinions or belief; but that all men shall be free to profess, and by argument to maintain, their opinions in matters of religion, and that the same shall in no wise diminish, enlarge, or affect their civil capacities.*"
- In the *Notes On the State of Virginia*, Jefferson wrote, "*Millions of innocent men, women and children, since the introduction of Christianity, have been burned, tortured, fined, and imprisoned. What has been the effect of this coercion? To make half the world fools and half hypocrites; to support roguery and error all over the world…*"

- Jefferson was asked by Danbury Baptists to explain the first amendment to the US Constitution. It was then that he coined the phrase, "*…a wall of separation between church and state.*"
- In regard to governmental religion Jefferson stated, "*The legitimate powers of government extend to such acts only as are injurious to others. But it does me no injury for my neighbour to say there are twenty gods, or no god. It neither picks my pocket nor breaks my leg.*"
- Thomas Jefferson reworked the bible and removed the supernatural aspects of Jesus' life in a book he wrote called *The Life and Morals of Jesus of Nazareth*.
- Jefferson's actions would not be considered very moral by Christian standards of today:
  - Jefferson advocated the forced removal and extermination of the native Americans saying in a letter to the Secretary of War, "*If we are constrained to lift the hatchet against any tribe, we will never lay it down until that tribe is exterminated, or driven beyond the Mississipi.*"
  - Jefferson did not approve of women's suffrage and, while President, wrote that, "*The appointment of a woman to office is an innovation for which the public is not prepared, nor am I.*"
  - Jefferson owned several slaves.
  - After Jefferson's wife died he used his slave, Sally Hemings, as a mistress and sired several children with her. Such an act can accurately be described as rape.

**Claim:** Benjamin Franklin was a Christian.
**Counters:**

- In Chapter 6 of Franklin's autobiography he explains his conversion to deism by writing, "*Some books against Deism fell into my hands; they were said to be the substance of sermons preached at Boyle's Lectures. It happened that they wrought an effect on me quite contrary to what was intended by them; for the arguments of the Deists, which were quoted to be refuted, appeared to me much stronger than the refutations; in short, I soon became a thorough Deist.*"
- In *Toward the Mystery* Franklin wrote, "*I have found Christian dogma unintelligible. Early in life I absented myself from Christian assemblies.*"
- Franklin wrote *A Dissertation On Liberty and Necessity, Pleasure and Pain* which argues that an omnipotent, benevolent God is incompatible with notions of human free will and morality.
- In a letter to Ezra Stiles, Franklin doubts the divinity of Jesus by writing, "*As to Jesus of Nazareth, my Opinion of whom you particularly desire, I think the System of Morals and his Religion, as he left them to us, the best the world ever saw or is likely to see; but I apprehend it has received various corrupt changes, and I have, with most of the present Dissenters in England, some Doubts as to his divinity…*"
- In Volume 13 of *Poor Richard's Almanac* Franklin explained that religion in the government is a sign the religion is bad, by writing,

"*When a religion is good, I conceive it will support itself; and when it does not support itself, and God does not care to support it, so that its professors are obliged to call for the help of the civil power, 'tis a sign, I apprehend, of its being a bad one.*"

- In a letter to his father, Franklin wrote, "*I think vital religion has always suffered when orthodoxy is more regarded than virtue.*"
- In *Articles of Belief and Acts of Religion* Franklin wrote, "*I cannot conceive otherwise than that He, the Infinite Father, expects or requires no worship or praise from us, but that He is even infinitely above it.*"
- In a letter to Reverend George Whitefield Franklin chastises religious dogma by writing, "*The faith you mention has doubtless its use in the world. I do not desire to see it diminished, nor would I desire to lessen it in any way; but I wish it were more productive of good works than I have generally seen it. I mean real good works, works of kindness, charity, mercy, and public spirit, not holy-day keeping, sermon-hearing, and reading, performing church ceremonies, or making long prayers, filled with flatteries and compliments, despised even by wise men, and much less capable of pleasing the Deity.*"
- In an issue of *Poor Richard Almanac* Franklin wrote, "*The way to see by Faith is to shut the eye of Reason.*"
- Franklin again chastises Christian dogma in a letter to Jared Ingersoll by writing, "*When I traveled in Flanders I thought of your excessively strict observation of Sunday, and that a man could hardly travel on that day among you upon his lawful occasions without hazard of punishment, while where I was everyone traveled, if he pleased, or diverted himself in any other way; and in the afternoon both high and low went to the play or the opera, where there was plenty of singing, fiddling, and dancing. I looked around for God's judgments, but saw no sign of them. The cities were well built and full of inhabitants, the markets filled with plenty, the people well favored and well clothed, the fields well tilled, the cattle fat and strong, the fences, houses, and windows all in repair, and no 'old tenor' anywhere in the country; which would make one almost suspect that the deity was not so angry at that offense as a New England justice.*"

**Claim:** John Adams was a Christian.
**Counters:**

- Adams was a believer in God, but he was a Unitarian and did not believe that Jesus was Christ, though he did approve of his teachings.
- Adams, while serving in the Senate, approved the *Treaty of Tripoli* which declares that, "*the government of the United States is not, in any sense, founded on the Christian religion.*"
- In a letter to Benjamin Rush, Adams wrote "*I have attended public worship in all countries and with all sects and believe them all much better than no religion, though I have not thought myself obliged to believe all I heard.*"

**Claim:** Thomas Pain was a Christian
**Counter:** Thomas Paine was an influential founding father and an outspoken Deist. He wrote *The Age of Reason*, which reads: "*All national institutions of churches, whether Jewish, Christian or Turkish, appear to me no other than human inventions, set up to terrify and enslave mankind, and monopolize power and profit.*"

**Claim:** James Madison was a Christian.
**Counter:** Madison was officially an Episcopalian, although his views and actions were much closer to Deism and Unitarianism than conventional Christianity.

**Claim:** James Monroe was a Christian.
**Counter:** Because Monroe burned nearly all of his personal letters, and the few that remain don't address his religious views, it is difficult to judge his religion. Some historians classify him as a deist, but if he was a Christian, he wasn't an outspoken Christian.

**Claim:** Abraham Lincoln was a Christian.
**Counters:**

- Though he attended church, Lincoln never officially joined any denomination.
- Some claim Lincoln became a stronger Christian when his 11-year-old son died, but Lincoln's close friend and bodyguard, Ward Hill Lamon, claimed that Lincoln never told him such, nor did he act like more of a Christian during his tenure as president.
- Lincoln wrote to Judge J.S. Wakefield, "*My earlier views of the unsoundness of the Christian scheme of salvation and the human origin of the scriptures, have become clearer and stronger with advancing years and I see no reason for thinking I shall ever change them.*"
- Early in his political career, Lincoln wrote a manuscript defending Thomas Paine's Deist book, *The Age of Reason.* Lincoln wanted to publish the manuscript, but his friend Samuel Hill destroyed it in order to protect Lincoln's political future.

## *Claims About US Tradition*

**Claim:** The United States was founded on Christian principles because we have the slogan "In God We Trust" on our money.
**Counters:**

- "In God We Trust" did not appear on US currency until 1864, 88 years after the USA declared independence.

- The motto was added during the time of increased fear and religious sentiment when the American Civil War was raging and many appeals from frightened devout Christians urged the United States to recognize God on their coins.

**Claim:** The United States was founded on Christian principles because our national motto is "In God We Trust".
**Counter:** This motto was not adopted until 1956, 180 years after the USA declared independence. Obviously, it has nothing to do with the foundation of the USA.

**Claim:** The United States was founded on Christian principles because the Pledge of Allegiance contains the phrase "under god".
**Counters:**

- The Pledge of Allegiance, wasn't published until 1892, 116 years after the USA declared independence.
- The original pledge read, "*I Pledge Allegiance to my Flag and the Republic for which it stands, one nation indivisible with liberty and justice for all.*" It wasn't until 1954 when the Roman Catholic Knights of Columbus convinced our government to add the phrase, "under god", 178 years after the USA declared independence.
- The Pledge was written as an advertising ploy to help a children's magazine make money selling flags for Columbus Day (Columbus never set foot in the US). Hardly a divine origin.

**Claims:**

- The United States is a Christian nation because we swear on the bible in court houses and the president is sworn in on a bible.
- The United States is a Christian nation because we say, "so help me God," after many oaths.

**Counter:** No federal document has ever mandated swearing oaths on a bible or with the words, "so help me God." Biblical oaths are merely a custom.

**Claim:** The First Amendment of the United States Constitution grants freedom of religion, proving the Constitution is a religious document.
**Counter:** The US Constitution, the primary document that the USA was founded on, is a secular document.

- The First Amendment contains the Establishment Clause which states that "*Congress shall make no law respecting an establishment of religion…*"
- The words "God" and "Christianity" are not mentioned anywhere in the Constitution.
- Article 6 prevents the practice of using religious tests from being used in governmental hiring.
- The Presidential Oath of Office, in Article 2, does not contain the phrase "*so help me God*" and does not require swearing on the bible.

**Claim:** The Ten Commandments are seen in many government buildings.
**Counter:** Of the Ten Commandments, only three have ever been applicable to US federal law; homicide, theft, and perjury. However, those three crimes existed in most cultures prior to Judaism, so they can't even be said to have come from the Ten Commandments.

**Claim:** The US is a Christian nation because there are more Christians living here than other religions.
**Counters:**

- The foundation of US democracy requires that minorities have freedom to express their beliefs.
- The Native Americans were the original majority of the US. They were not Christians. However, Christians invaded their land and committed genocide by murdering nearly every single one of them (and according to the belief of Manifest Destiny, God told them to drive off the natives) thus making them the majority in the US.
- If Islam were to suddenly become the most popular religion in the US, would you declare the US to be an Islamic nation?

# 3.1.8 - Holy Places

Like all religions, Christianity has several places that it regards as holy. Pilgrims journey to these holy places to seek spiritual guidance and physical healing. However, the physical healing never seems to happen.

## *Claims*

**Claim:** Since 1860, the Vatican has confirmed that 67 miracles have occurred at the Sanctuary of Lourdes in France.
**Counters:**

- From 1860 to 2008, Lourdes has received an estimated 200,000,000 pilgrims seeking a miracle and only 67 have received one. That is a miracle rate of three ten-millionths of a percent (0.000 000 3%); statistically insignificant.
- None of those 67 miracles are very miraculous. Nobody grew back a missing limb, no severed spinal columns were reattached, nobody rose from the dead—they were only minor "miracles".
- More people have accidentally died at Lourdes than have received a miracle.

**Claim:** The precise place of where Jesus was whipped, crucified, and entombed can be found at Calvary in Jerusalem.

**Counter:** There is no physical evidence of Calvary being the actual place of Jesus' death or even documentation. All accounts come from unreliable oral tradition.

# 3.1.9 - Glossolalia

Glossolalia is the technical term for speaking in tongues. According to the book of Acts (2:1-11) during Pentecost, people were granted power by the Holy Spirit to speak in languages unknown to them (xenoglossy) in order to spread the word of God. Modern day Christians, especially the Pentecostal denomination, claim to speak in tongues as well, however, unlike the book of Acts, they don't speak in any known language. To an outsider it appears like the person is merely babbling incoherently, but Christians view it as a profound religious experience. However, Christians can't agree as to whether the "language" used while speaking in tongues is an ancient forgotten language, a divine language of God, or something else entirely. Some groups, like the Cessationists, even claim that the modern form of speaking in tongues is evil.

## *Claims*

**Claim:** People who speak in tongues are doing so in the same manner as read in the bible.
**Counter:** The bible claims that the people who spoke in tongues used it to speak the language of those who are foreign so that they could spread the word of God. "*Now when this was noised abroad, the multitude came together, and were confounded, because that every man heard them speak in his own language…*" (Acts 2:6 KJV). However, people who speak in tongues today speak in gibberish that nobody, including themselves, can understand.

**Claim:** The language used while speaking in tongues is a real language.
**Counters:**

- In the book *Looking for a Miracle* by Joe Nickell, Dr. William T. Samarin, professor of anthropology and linguistics at the University of Toronto said, "*Glossolalia consists of strings of meaningless syllables made up of sounds taken from those familiar to the speaker and put together more or less haphazardly… Glossolalia is language-like because the speaker unconsciously wants it to be language-like. Yet in spite of superficial similarities, glossolalia fundamentally is not language.*"

- The syllables that make up glossolalia are merely jumbled up phonemes of the speaker's native languages. An English speaker will use English sounds to construct glossolalia, a Spanish speaker will use Spanish sounds, etc. If it were a real language it should have unique characteristics and every speaker should speak in a similar fashion.
- Linguists find that glossolalia lacks any identifiable semantics, syntax, or morphology that are needed for a language to be used for communication. It has much more in common with randomly spouted gibberish.

# 3.1.10 – Stigmata

Stigmata are the physical wounds or sensation of pain in the similar areas of crucifixion that Jesus supposedly suffered. Stigmata is the plural form of "stigma", which means a branding or mark. A person who has stigmata is called a stigmatic. Stigmata are almost always reported on Catholics, and almost always on women.

## *Claims*

**Claim:** The stigmata wounds are real and divine.
**Counter:** The stigmata are most likely nothing more than pious fraud often induced by a mental disorder. People cut themselves in the supposed manner of Jesus' crucifixion for many reasons including self-punishment, to experience the suffering of Jesus, and to convince other people of divine intervention. Because many stigmatics have been proven false, and because no one has ever recorded divine stigmata being made, one can presume that all instances of stigmata are fraudulent.

**Claim:** Stigmata always occur in the same place that Jesus suffered.
**Counter:** The location of the stigmata are not consistent. Earlier art depicts Jesus being crucified through his hands, and likewise, stigmata wounds occurred on the hands. Yet, when archaeologists discovered that the Romans crucified with nails through the wrists, not the hands, the stigmata suddenly began appearing on wrists, indicating that although the stigmatics pay attention to contemporary knowledge, they are cutting themselves none-the-less. Also, the bible doesn't explain which side of Jesus was pierced by a lance, and because of this, stigmatics can't decide on which of their sides should have the wound. Consequently, the wound tends to appear comparatively to the victim's primary hand, also indicating that the wounds are self-inflicted.

**Claim:** People have suffered the stigmata ever since Jesus was crucified.

**Counter:** No documented cases of stigmata exist prior to around 1250 CE which is also around the time when Jesus became the icon of Christianity in the West.

**Claim:** Stigmata are divine in origin.
**Counter:** Few stigmatics allow forensic evaluation of their wounds, but of those who have, the wounds were found to be made with very mundane instruments like knives or razors.

# 4.0 - Philosophy

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Philosophy is a softer science that deals with matters like existence, truth, ascetics, knowledge, language, justice, and logic. Although answers are much less definitive than hard sciences like physics and cosmology, it still uses the scientific method for a critical and systematic approach in its reasoning, thereby coming up with sound theories and results.

Because philosophy is more open than other studies, it is harder to debate. However, you can still use logic, reasoning, and the scientific method to come to form valid conclusions.

# 4.1 - Philosophical Systems

There are many philosophical systems that people subscribe to. Philosophical systems are different from religions. Philosophy is based on logic and ascetics, while religion is based on faith and the supernatural. Many philosophical systems come under attack by religious groups because they denounce religion or the supernatural. Below are some philosophical systems that have erroneous claims made about them.

# 4.1.1 - Agnosticism

Agnosticism is the philosophical position that rejects religious gnosticism—the claim of being able to understand spiritual matters. Agnosticism can be divided into two major distinctions: strong and weak. A strong agnostic states that the true nature of gods is impossible to understand, while a weak agnostic states that, while it may be possible to know if gods exist, there currently isn't enough information to make a decision. There are other minor forms of agnosticism as well like apathetic agnosticism, agnostic theism, agnostic atheism, and ignosticism.

### *Claims*

**Claim:** Agnosticism is a religion.
**Counter:** Agnosticism is not a religion. Religions are systems of belief, most commonly in a god or pantheon of gods and the writings and ideals associated with those gods. Agnosticism, on the other hand, is a philosophy that states that the existence of gods is unknowable or unknown. It is not faith-based, it doesn't require a belief in anything; it's merely a logical way of viewing the universe.

**Claim:** Agnostics are fence sitters who can't make up their minds.
**Counter:** Being an agnostic doesn't mean that you haven't made up your mind, it is affirming that the answer regarding gods is currently unknown, or may always be unknown. As an analogy, think of the constant $\pi$. A mathematician would tell you that last digit of $\pi$ is unknown, and it may never be known. This doesn't mean that the mathematician can't make up his mind, it means that the mathematician is holding off on making a decision until more information is made available.

## 4.1.2 – Atheism

Atheism is the philosophical position that rejects theism—the belief in gods. Atheism can be divided into three major distinctions: implicit, weak, and strong. Implicit atheists states that gods are irrelevant because they have either not even considered the existence of gods or have not found a sufficient definition for gods. Implicit atheists are atheists by default and have no burden of proof. Explicit atheists are broken up into weak and strong atheists. A weak atheist states that they do not believe in gods, while a strong atheist states that gods do not exist. Weak and strong atheists, having considered the possibility of the existence of gods, must be prepared to offer an explanation of their disbelief. Weak atheism only needs to state that they see no evidence to believe in gods, or that the evidence that theists contend could be explained by other means. A strong atheist, however, must go further and offer proof of why they disbelieve gods. This is usually done by showing that the reasons for why people believe in gods are faulty.

### *Claims*

**Claim:** Only people who actively disbelieve in gods are atheists.
**Counter:** The definition of "atheist" is right in the name; *a* meaning "not", *theist* meaning "someone who believes in gods". It is the opposite of a theist. Therefore, everyone who is not a theist is, by definition, an atheist.

**Claim:** If anyone who doesn't actively believe in gods is an atheist, then animals, plants, and rocks should be considered atheists as well.
**Counter:** All non-sentient beings are technically implicit atheists, since they don't have the ability to comprehend the question.

**Claim:** Atheism is a religion.
**Counter:** Atheism is not a religion. Religions are systems of belief, most commonly in a god or pantheon of gods and the writings and ideals associated with those gods. Atheism, on the other hand, is a philosophy that states that there is no evidence, and therefore no reason, to believe that gods exist. It is not faith-based, it doesn't require a belief in anything; it's merely a logical way of viewing the universe.

**Claim:** Atheism is the belief that nothing suddenly exploded into something for no reason and then that non-living something suddenly became alive for no reason and then began replicating itself for no reason until it became dinosaurs.
**Counter:** This is a combination of several theories including the big bang, abiogenesis, and evolution, but it doesn't actually address atheism. Atheism is the lack of a belief or disbelief of gods, it doesn't concern itself with the creation of the universe or life. While many atheists are also supporters of the big bang theory, abiogenesis, and evolution, it is not mandatory to believe in any of them to be an atheist.

**Claim:** Atheism doesn't offer hope or comfort.
**Counter:** To an atheist, atheism is the truth, and the truth is comforting. Specific comforts come in many ways to atheists like knowing that there isn't a vengeful god preparing to smite you; knowing that you can live your life the way you choose to live without fear of Hellfire; living with the knowledge that this life is your only one, so you should make the best of it; knowing that you are responsible for your actions—there is no "devil making you do it"—that your actions do make a difference in the lives of those around you; and many other comforting thoughts.

**Claim:** Atheism is destructive and immoral.
**Counters:**

- There are no studies to show that atheists are more likely to commit crimes than theists.
- There has never been a large-scale war based on atheism, however religion was the primary cause of the Milkhemet Mitzvahs, the Cherems, the Jewish-Roman Wars, the violent Islamic Jihads, the Reconquista, the Crusades, the Spanish Inquisition, the French Wars of Religion, the Thirty Years War, Manifest Destiny, the Arab-Israeli Conflict, the Troubles in Northern Ireland, and witch hunts that have been going on for several millenniums.
- Many of the world's countries with the largest population of non-religious citizens (Sweden, Norway, France, the United Kingdom, Iceland, the Czech Republic, and the Netherlands) also have some of the

lowest murder rates in the world. (Eurostat 2005, UN Office 2006)

- According to a 2004-2006 Gallup poll, Louisiana made it in the top 3 of the list of states with the most citizens who regularly attend church. Louisiana also made it in the top 3 of the 2004-2005 US Department of Justice's list of states with the highest murder rate.
- Religious people have a higher divorce rate than non-religious people. A 1999 study by the Barna Research Group interviewed 3,854 adults from the 48 contiguous states regarding divorce. Their study shows that Jews have a 30% divorce rate, those who refer to themselves as born-again Christians have a 27% divorce rate, other Christians have a 24% divorce rate, and atheists/agnostics have a 21% divorce rate. See *Table 4.1.2 A*.
- Christians are more likely to be found in prison than non-religious people: The 2001 American Religious Identification Survey shows that of Americans, 76.5% are Christians (52.0% Protestant, 24.5% Catholic) and 14.1% are non-religious. A 1997 study of the US Federal Bureau of Prisons shows that, of all incarcerated Americans, 79.5% are Christian (39.2% Catholic, 35.0% Protestant, 5.3% other Christian) and only 0.2% are atheists. Comparatively, this yields a prison population to US citizen ratio of 103.9% Christian to 1.4% non-religious. See *Table 4.1.2 B*.

*Table 4.1.2 A - US Divorce Rate By Belief System*

| Group | Divorce Rate |
|---|---|
| Jews | 30% |
| Born-Again Christians | 27% |
| Other Christians | 24% |
| Atheists / Agnostics | 21% |

1999 Barna Research Group

*Table 4.1.2 B - US Prison Population By Belief System*

| | % US Population | % Prison Population | Ratio |
|---|---|---|---|
| Christian | 76.5% | 79.5% | 103.9% |
| Non-Religious | 14.1% | 0.2% | 1.4% |

2001 American Religious Identification Survey
1997 US Federal Bureau of Prisons

**Claim:** The bible reads, in Psalm 14:1, "*The fool hath said in his heart, There is no God.*"
**Counter:** Contradictory, the bible also reads, in Matthew 5:22, "*Whosoever shall say, Thou fool, shall be in danger of hell fire.*"

**Claim:** Atheists have the burden of proof to prove that god don't exist.
**Counter:** Actually, only explicit atheists have the burden of proof. Although it impossible to definitively disprove many things, one can use logic to disprove certain claims that are contradictory, and can also demonstrate, through lack of evidence or conflicting evidence, that certain claims are highly improbable. For example:

- All of the existing proofs used by theists to prove the existence of a god or gods are contradictory, invalid, or illogical.
- The so-called miracles found in religious texts are explained as very profound and supernatural, yet no miracles of that sort seem to occur now that people are more educated and have a better understanding of the laws of nature.
- There is very little geological or historical evidence to support the stories found in religious texts: no proof of a single couple that populated the earth, no proof of a global flood, no proof that the Hebrews wandered in the desert for 40 years after leaving Egypt, no proof of the existence of the prophet Mohammad, etc.
- Many of the prophecies in religious texts did not occur even though their deadline has passed. See *Table 3.1.2 F.*
- Most religious texts depict their gods as intervening in the lives of humans, often directly communicating with them, yet no evidence of intervention is seen now that people are more educated and have a better understanding of psychological disorders.
- When religious practices like prayer and faith healing are clinically tested they are found to be ineffective (see *3.1.5 - Prayer*).
- Spiritual constructs like the soul, angels, demons, etc. have never been shown to exist.

**Claim:** Atheists don't donate as much money to charity as theists.
**Counters:**

- Many churches require charity as part of their confirmation. Required charity out of fear of Hell is not charity, it's extortion.
- Many charities have a religious agenda which pressures their recipients into going to church. This isn't charity, it's advertising.
- Most statistics regarding charity include church tithes as part of charity, when in fact, most church tithes go directly into operating churches, which is not charitable.
- The amount of money that someone gives to charity is irrelevant to their morality. If it were, rich eccentrics who donate millions to a church would be considered more moral than Jesus.

**Claim:** Atheist are more likely to commit suicide.
**Counters:**

- No studies, conducted by respectable researchers, agree with this claim. Some psychologists, with religious convictions, conclude that atheism may be a factor in suicide, but no evidence gives their opinions merit.
- Anyone who has ever dealt with the difficulties of suicide knows that you can't simply point a finger at a single thing that causes it.
- Atheism eliminates the stress that many religious people suffer when dealing with the fear of damnation to Hell and the fear of God's wrath.
- Most religious people who are contemplating suicide are afraid to do it because their religion speaks of severe punishment in their supposed afterlife.
- Suicide, while tragic, is not necessary immoral from a secular stand point, and therefore not important to the subject of morality.

**Claim:** Atheists are simply rebels who are angry at god, the church, and their fathers.
**Counters:**

- Every demographic, including strongly religious, has plenty of people who have poor relationships with their fathers and religious heads. There are no studies that compare atheists to other demographics in this regard. Therefore this statement is unfounded.
- Atheists don't believe in God, and therefore cannot be mad at him. This is equivalent to saying that you're mad at an invisible pink unicorn.
- Atheists may be mad at churches or church lifestyles, but this anger is usually a reaction to their practices of frightening children with stories of Hell and Satan or the fact that they don't pay taxes, yet have significant strong political influence or the fact that they molest children.

**Claim:** You don't find atheists in foxholes.
**Counters:** The point of this hasty generalization is that atheists secretly believe in a god, and, when faced with death, they will ask for that god's help. However, there are many problems with this statement.

- Only people brought up in a predominately religious culture will believe that religion is the answer to life's most difficult dilemmas. In cultures where the majority of the population is not religious, or believes in a religion without gods, the statement is foolish. Most Buddhists don't believe in gods, and therefore probably won't start just because their lives are threatened.
- Because this statement is purely hypothetical, it's also totally unproven. All people react differently to impending doom. To say that the first instinct of all atheists whose lives are threatened is to denounce their personal views in favor of someone else's is ludicrous.
- The flip side of this is that you shouldn't find religious people in hospitals because they should have faith that their god will heal their ails.

**Claim:** Adolf Hitler was an atheist, and look what happened.
**Counters:**

- Hitler was raised as a Roman Catholic. Although he had more nationalistic views, believing that Germany was more important than God, and that Christianity was too passive a religion, his actions and statements were that of a Christian and certainly not an atheist.
- In Hitler's *Mein Kampf* he writes about Jews, "*Their very existence is an incarnate denial of the beauty of God's image in His creation.*"
- Also in *Mein Kampf* Hitler writes about the Aryans, "*Whoever would dare to raise a profane hand against that highest image of God among His creatures would sin against the bountiful Creator of this marvel and would collaborate in the expulsion from Paradise.*"
- Hitler remained a formal member of the Catholic Church his entire life.
- The book *Adolf Hitler: The Definitive Biography* quotes Hitler saying, "*I am now as before a Catholic and will always remain so.*"
- The book *The Catholic Church and Nazi Germany* quotes Hitler saying, "*[I] regard Christianity as the foundation of our national morality and the family as the basis of our national life.*"
- In the book *The Speeches of Adolf Hitler: April 1922-August 1939* Hitler talks about Jesus saying, "*My feelings as a Christian points me to my Lord and Savior as a fighter. It points me to the man who once in loneliness, surrounded only by a few followers, recognized these Jews for what they were and summoned men to fight against them and who, God's truth! was greatest not as a sufferer but as a fighter.*"
- The book *Kirchenkampf in Deutschland 1933-1945* explains how Hitler was against the doctrine of state atheism which was being practiced by the Soviet Union at the time.
- Under Hitler's reign, his *Wehrmacht* soldiers (defense force) wore the phrase "*Gott Mit Uns*" (God with us) on their belt buckles.
- Even if an atheist does terrible things, it does not mean that atheism is the cause. Many devoutly religious people have become serial killers, war mongers, and rapists. There are many factors that can be attributed to a person becoming violent, and evidence must exist to assign blame.

**Claim:** Atheists can't prove that gods don't exist.
**Counter:** You can't prove that Santa Claus doesn't exist either because it's impossible to definitively prove that anything doesn't exist. However, just like Santa Claus, there is no evidence to support the existence of gods. When no evidence supports the existence of something (unicorns, fairies, gods, etc.), the logical conclusion is that it doesn't exist.

**Claim:** Just because there isn't evidence for the existence of gods, doesn't mean gods don't exist. They could still exist, but just not leave evidence of their existence.
**Counter:** Currently there are two categories: things that do exist and have evidence of their existence and things that do not exist and do not have evidence for existence. This argument invokes a third category; things that do

exist, but do not have evidence. However, if the third category is valid, there would be no way to distinguish it from things that do not exist because they both lack evidence of existence. Therefore, anything, regardless of how far-fetched it may be, would be treated as possibly existing (the tooth fairy, leprechauns, talking teapots, etc.). It is, therefore, logically valid to dismiss the third category. If, however, the thing does have evidence for existence, then it belongs in the first category, and can be scientifically tested.

# 5.0 - Hindrances

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This section lists many of the hindrances that all people must deal with when trying to observe and comprehend new information. Everyone will eventually succumb to one or more of these hindrances, so it is important to understand them, and know how to avoid them. That is why there are examples of these hindrances and solutions to get beyond them.

# 5.1 - Human Limitations

### *Confirmation Bias / Selective Thinking*

**Definition:** The process whereby one tends to notice and look for what confirms one's beliefs, and to ignore, not look for, or undervalue the relevance of what contradicts one's beliefs.
**Example:** If one believes that more murders occur during a full moon, then one will tend to take notice of murders that occur during a full moon and tend not to take notice of murders that occur at other times.
**Solution:** Obtain and objectively evaluate all relevant information and sides of an issue before passing judgment.

### *False Memories / Confabulation*

**Definition:** Being unaware that our memories are often "manufactured" to fill in the gaps in our recollection, or that some memories of facts, over time, can be unconsciously replaced with fantasy.
**Example:** Police officers should not show a photo of a possible assailant to a witness prior to a police lineup, or the actual memory of the witness may be unconsciously replaced.
**Solution:** Put more reliance on proven facts than memory recollection or testimonies from others. Know your own memory limitations.

## *Ignorance*

**Description:** The lack of essential background knowledge or information on a subject prior to making a judgment.
**Example:** One may be convinced a "yogi" has the power to levitate objects, but does not see the thin wire attached to them.
**Solution:** Perform appropriate research on multiple sides of issues to obtain all pertinent evidence, before reaching conclusions.

## *Perception Limitations*

**Description:** Being unaware of our own perception limitations that can lead to misconceptions about reality.
**Example:** Looking up at the stars at night and perceiving they are as close as the moon and planets.
**Solution:** Recognize that "seeing is not always believing" because of our sensory limitations. Know when & how to verify your observations with other sources.

## *Personal Biases / Prejudices*

**Description:** We each have personal biases and prejudices, resulting from our own unique life experiences and world-view, which make it difficult to remain objective and think critically.
**Example:** Some people are biased against claims made by scientists because their world-view appears too cold and impersonal.
**Solution:** Resist your own biases by focusing on the facts, their sources, and the reasoning in support of arguments.

## *Physical & Emotional Hindrances*

**Description:** Stress, fatigue, drugs, and related hindrances can severely affect our ability to think clearly and critically.
**Example:** Air traffic controllers often have difficulty making good judgments after long hours on duty.
**Solution:** Refrain from making critical decisions when extremely exhausted or stressed.

### *Testimonial Evidence*

**Description:** Relying on the testimonies and vivid anecdotes of others to substantiate one's own beliefs, even though testimonies are inherently subjective, inaccurate, unreliable, biased, and occasionally fraudulent.
**Example:** Dramatic stories of Bigfoot sightings do not prove the existence of Bigfoot.
**Solution:** Resist making judgments based on testimonies alone. Extraordinary claims generally require extraordinary evidence.

# 5.2 – Language Confusion

### *Ambiguity*

**Description:** A word or expression that can be understood in more than one way.
**Example:** From the statement "Lying expert testified as trial", is the expert a liar or is the person an expert on telling when someone is lying?
**Solution:** If the intended meaning of an ambiguous word or expression cannot be determined, avoid making judgments.

### *Assuring Expressions*

**Description:** Using expressions that disarm you from questioning the validity of an argument.
**Example:** Expressions such as "As everyone knows…", and "Common sense tells us that…"
**Solution:** Disregard assuring expressions and instead focus on facts & reasoning that support arguments.

### *Doublespeak Euphemisms*

**Description:** The use of inoffensive words or expressions to mislead, disarm, or deceive us about unpleasant realities.
**Example:** Referring to a policy of mass murder as "ethnic cleansing" or the inadvertent killing of innocent people as "collateral damage."
**Solution:** Look beyond the emotive (emotional) content and recognize the cognitive (factual) content of euphemistic words and expressions.

## *Doublespeak Jargon*

**Description:** The use of technical language to make the simple seem complex, the trivial seem profound, or the insignificant seem important, all done intentionally to impress others.
**Example:** Referring to a family as "a bounded plurality of role-playing individuals" or a homeless person as a "non-goal oriented member of society."
**Solution:** Recognize the cognitive (factual) content of jargon words and expressions.

## *Emotive Content*

**Description:** Intentionally using words to arouse feelings about a subject to bias others positively or negatively, in order to gain influence or power.
**Example:** Naming detergents "Joy" and "Cheer" (positive), not "Dreary" and "Tedious" (negative). The military using the phrase "neutralizing the opposition" (less negative) rather than "killing" (negative).
**Solution:** Learn to recognize and distinguish the emotive (emotional) content of language. Try to focus on reasoning and the cognitive (factual) content of language when evaluating arguments.

## *False Implications*

**Description:** Language that is clear and accurate but misleading because it suggests something false.
**Example:** The dairy industry cleverly expresses fat content as a percentage of weight, not of calories. Thus 2% "low" fat milk really has 31% fat when fat is measured as a percentage of calories.
**Solution:** Understand not only the facts, but also their relevance and context.

## *Gobbledygook*

**Description:** The use of confusing non-technical language to mislead or deceive.
**Example:** A company using lengthy and intimidating language to simply express that if your check bounces, your receipt is voided.
**Solution:** Recognize the cognitive (factual) content of gobbledygook words and expressions.

## *Hedging / Weasel Words*

**Description:** Language that appears to commit one to a particular view, but because of its wording, allows one to retreat from that view.
**Example:** President Clinton's claim that he did not have "a sexual relationship" with Monica Lewinski, in which he later explained that "engaging in sexual acts" was not "a sexual relationship."
**Solution:** Be on the lookout for hedging language that suppresses facts supporting an argument.

## *Judgmental Words*

**Description:** Stating opinions as though they were facts, so the audience does not have to "bother" judging for themselves.
**Example:** The President took justifiable pride in signing the peace treaty.
**Solution:** Distinguish what is fact from what is opinion in any statement or argument.

## *Meaningless Comparisons*

**Description:** Language that implies that something is superior but retreats from that view.
**Example:** An ad that claims a battery lasts "up to" 30% longer, but does not say it will last 30% longer, and if it did, longer than what?
**Solution:** Avoid making judgments if it is not exactly clear what is being compared.

## *Vagueness*

**Description:** Language which is less precise than the context requires.
**Example:** If someone needs to be paid back tomorrow, and the borrower says "I'll pay you back soon", the borrower's response was too vague.
**Solution:** Be aware of the consequences of imprecise claims based on vagueness.

# 5.3 - Faulty Logic or Perception

## *Ad Hoc Hypothesis*

**Description:** A hypothesis, which cannot be independently tested, is used to explain away facts that refute a theory or claim.
**Example:** Psi researchers often blame the "hostile thoughts" of onlookers for adversely affecting instruments measuring the alleged existence of psychic powers.
**Solution:** Put low reliance, or reserve judgment on, claims that cannot be independently tested

## *Apophenia / Superstition*

**Description:** Erroneous perception of the connections between unrelated events.
**Example:** Irrationally believing that how one wears their hat while watching a football game can influence the score.
**Solution:** Recognize the difference between cause & effect versus unrelated coincidence.

## *Argument From Ignorance*

**Description:** A logical fallacy claiming something is true because it has not been proven false.
**Example:** Believing that the universe was created by an intelligent designer because nobody can prove that it wasn't.
**Solution:** Do not believe a proposition simply because it cannot be proven false.

## *Begging the Question*

**Description:** A fallacious form of arguing in which one assumes to be true something that one is trying to prove.
**Example:** A man claiming that paranormal phenomena exists because he has had experiences that can only be described as paranormal.
**Solution:** Recognize when an argument assumes to be true something it is attempting to prove. When this occurs, seek alternative explanations.

## *Clustering Illusion / Texas Sharpshooter Fallacy*

**Description:** The erroneous impression that random events that occur in clusters are not random.
**Example:** In ESP experiments, a "water witcher" using dowsing may find water at a slightly higher-than-chance rate over a brief period of time, and mistakenly assume this proves dowsing really works.
**Solution:** Understand the basic principles of probability & statistics. Recognize when numbers are being used correctly & objectively versus incorrectly & with bias.

## *False Analogies*

**Description:** Making illogical analogies to support the validity of a particular claim.
**Example:** Arguing that two children sharing the same bedroom is wrong because double-celling of criminals in a penitentiary can lead to bad behavior.
**Solution:** Learn to recognize the faulty assumptions behind false analogies.

## *Forer Effect*

**Description:** The tendency to accept vague personality descriptions that can be applicable to most people as uniquely applicable to oneself.
**Example:** Astrology readings, intended for people of a specific sign, can be applicable to most individuals. This effect usually works in conjunction with 'Self-Deception' and 'Wishful Thinking.'
**Solution:** Critically evaluate if personality characterizations are truly unique to you, or could apply to most people.

## *Gambler's Fallacy*

**Description:** The fallacy that something with fixed probabilities will increase or decrease depending upon recent occurrences.
**Example:** The misconception that picking lottery numbers that have not yet been picked will increase your chances of winning.
**Solution:** Learn to recognize and distinguish events that have fixed versus variable probabilities.

## *Irrelevant Comparisons*

**Description:** Making a comparison that is irrelevant or inappropriate.
**Example:** Making a claim that Printer A makes better copies than Printer B, while ignoring the important fact that only Printer B can also fax, copy, and scan.
**Solution:** Be sure to compare "apples with apples."

## *Law of Truly Large Numbers*

**Description:** A failure to understand that with a large enough sample, many seemingly unlikely coincidences are in fact likely coincidences, i.e., likely to happen.
**Example:** The alleged uniqueness of the number 11 to the September 11 can mathematically shown to be not unusual at all, and merely a game to play with people's minds.
**Solution:** Understand the basic principles of probability & statistics. Recognize when numbers are being used correctly & objectively versus incorrectly & with bias to support an argument.

## *Non Sequitur*

**Description:** Reasons given to support a claim that are irrelevant.
**Example:** To say "I am afraid of water, so I will take up flying."
**Solution:** Lean to recognize when arguments are supported by irrelevant reasons.

## *Pareidolia*

**Description:** A type of misperception involving a vague stimulus being perceived as something clear, distinct, and highly significant.
**Example:** Most UFO, Bigfoot, Mary, Jesus, and Elvis sightings.
**Solution:** Recognize that a vague perception of a strange event can have many possible explanations. Seek alternative explanations that are more likely rather than more emotionally appealing.

## *Post Hoc Fallacy*

**Description:** The mistaken notion that because one thing happened after another, the first event caused the second event.

**Example:** Believing that beating drums during a solar eclipse will cause the sun to return to the sky.
**Solution:** Try to identify the known or possible causal mechanisms of observed effects, starting with those that are more likely.

## *Pragmatic Fallacy*

**Description:** Arguing something is true because "it works," even though the causality between this something and the outcome are not demonstrated.
**Example:** After using a magnetic belt for awhile, a woman notices her back pain is less, even though there may be a dozen other reasons for the reduced back pain.
**Solution:** Try to identify known or possible causal mechanisms for observed effects, starting with those that are more likely, not more emotionally appealing.

## *Regressive Fallacy*

**Description:** Failing to take into account the natural and inevitable fluctuations of things when assessing cause and affect.
**Example:** Assuming a man's neck pain consistently fluctuates over time, he will most likely try new remedies when the pain is at its worst point, then perhaps incorrectly assume that the pain got better because of the new remedy.
**Solution:** Try to identify and understand recurring behavioral patterns before making judgments about recently observed events.

## *Slippery Slope Fallacy*

**Description:** An argument that assumes an adverse chain of events will occur, but offers no proof.
**Example:** "Because regulators have controlled smoking in public places, their ultimate goal is to control everything else in our lives."
**Solution:** Evaluate the logic supporting an alleged adverse chain of events.

# 5.4 - Psychological and Sociological Pitfalls

## *Ad Hominem Fallacy*

**Description:** Criticizing the person making an argument, not the argument itself.
**Example:** "You should not believe a word my opponent says because he is just bitter because I am ahead in the polls."
**Solution:** Focus on reasons & facts that support an argument, not the person making the argument. Independently verify supporting facts if the source is in question.

## *Ad Populum / Bandwagon Fallacy*

**Description:** An appeal to the popularity of the claim as a reason for accepting the claim.
**Example:** Thousands of years ago the average person believed that the world was flat simply because most other people believed so.
**Solution:** A valid claim should be based on sound arguments, not popularity.

## *Communal Reinforcement*

**Description:** The process by which a claim, independent of its validity, becomes a strong belief through repeated assertion by members of a community.
**Example:** The communally reinforced yet mistaken belief that one can get rid of cancer simply by visualization and humor alone.
**Solution:** Do not follow the crowd simply because it gives you a feeling of acceptance and emotional security. Think for yourself.

## *Emotional Appeals*

**Description:** Making irrelevant emotional appeals to accept a claim, since emotion often influences people more effectively than logical reasoning.
**Example:** Advertisements that appeal to one's vanity, pity, guilt, fear, or desire for pleasure, while providing no logical reasons to support their product being better than a competitor.

**Solution:** If an argument requires a logical reason to support its claim, do not accept emotional appeals as sufficient evidence to support it.

## *Evading the Issue / Red Herring*

**Description:** If one has been accused of wrongdoing, diverting attention to an issue irrelevant to the one at hand.
**Example:** The President making jokes about his own character in order to disarm his critics & evade having to defend his foreign policy.
**Solution:** Learn to recognize evasion, which implies a direct attempt to avoid facing an issue.

## *Fallacy of False Dilemma / Either/or Fallacy*

**Description:** Intentionally restricting the number of alternatives, thereby omitting relevant alternatives from consideration.
**Example:** "You are either with us, or with the terrorists!"
**Solution:** Seek opposing arguments on the subject which may reveal the existence of other viable alternatives.

## *Irrelevant Appeal to Authority*

**Description:** An attempt to get a controversial claim accepted on the basis of it being supporting by an admirably or respectable person.
**Example:** "Since the Pope thinks capital punishment is morally justified, it must be morally justified."
**Solution:** Recognize that any appeal to authority is irrelevant to providing logical grounds and facts to support an argument.

## *Lawsuit Censorship*

**Description:** Repressing free speech and critical thinking by instilling fear through the threat of lawsuits.
**Example:** Journalist Andrew Skolnick was sued for his investigative reporting of Maharishi Mahesh Yogi and his Transcendental Meditation Movement.
**Solution:** If a counter-argument is not readily available, don't assume it does not exist—it could be suppressed by special interests.

## *Suggestibility / Conformity / Moses Syndrome / Deferring Judgment*

**Description:** Promises of happiness, security, power, wealth, health, beauty, etc., made again and again in a confident manner, by charismatic people with prestige, tend to be believed uncritically and without argument or proof.
**Example:** Hitler convinced an entire country to follow his dream of making Germany great, which included the subjugation and massacring of Jews. Also, Jim Jones of the Peoples Temple doomsday cult convinced 914 of its members to commit suicide.
**Solution:** Resist the human tendency to believe a charismatic leader simply because he/she appeals to your basic human needs. Seek alternate views & reliable sources for facts and objective reasoning to support arguments.

## *Poisoning the Well*

**Description:** Creating a prejudicial atmosphere against the opposition, making it difficult for the opponent to be received fairly.
**Example:** "Anyone who supports removing troops from Iraq is a traitor!"
**Solution:** When evaluating an argument, focus on the argument, not prejudicial remarks.

## *Political Censorship*

**Description:** Repressing free speech, distorting facts, or "cherry picking" facts to support a biased political viewpoint or dogmatic belief.
**Example:** When politicians intentionally provide inadequate or distorted facts on a particular issue, then conclusions reached by the public may be biased or faulty.
**Solution:** Learn all sides of an issue. People can present deceptively logical arguments that are built upon the selective choosing of facts.

## *Positive Outcome Bias*

**Description:** The tendency for researchers and journalists to publish research with positive outcomes between two or more variables, while not publishing research that shows no effects at all.
**Example:** The media will publish results showing a nutritional supplement can reduce anxiety, but will not publish other results showing the same supplement has no affect on reducing anxiety.

**Solution:** Put more reliance on claims which use methods that seek to eliminate positive outcome bias. Seek information from sources that do not have a biased interest in the results.

## *Shoehorning*

**Description:** The process of force-fitting some current event, after the fact, into one's personal, political, or religious agenda.
**Example:** Jerry Falwell and Pat Robertson claimed that American civil liberties groups, feminists, homosexuals, and abortionists bear partial responsibility for September 11th because their immoral behavior has turned God's anger toward America.
**Solution:** Understand the motives or agenda of people or organizations prior to making judgments on their arguments.

## *Sunk-Cost Fallacy*

**Description:** The psychological phenomenon of continuing to hold on to a hopeless investment for fear that what has been invested so far will be lost.
**Example:** Lyndon Johnson continued to commit many thousands of U.S. soldiers to Việt Nam even after he was convinced the U.S. could never defeat the Việt cộng.
**Solution:** Do not allow your feelings of fear & disgrace of taking a loss cause you to take even a bigger loss.

## *Wishful Thinking / Self Deception*

**Description:** The process of misinterpreting facts, reports, events, perceptions, etc, because we want them to be true.
**Example:** 94% of university professors think they are better at their jobs than their colleagues.
**Solution:** Understand that our individual view of what we think is true can be strongly biased by our needs, fears, ego, world view, etc.

# 6.0 - Glossary

**abductive reasoning** - A form of reasoning where you pick the a hypothesis that would, if true, best explain the evidence.

**abiogenesis** - The scientific theory that life on Earth came from non-life about 2-3 billion years ago.

**Abrahamic religions** - Refers to religions based on the teachings of the Israelite Abraham including: Judaism, Christianity, Islam, the Samaritans, the Druze, and the Bahá'í.

**absolute zero** - The theoretical coldest possible temperature characterized by the cessation of atomic movement. Zero on the Kelvin scale, or approximately −273.15 °C.

**acupuncture** - A Chinese form of therapy that involves inserting needles into the body at various meridians and manipulating them in an attempt to affect the flow of qi.

**Adam and Eve** - A Hebrew story about the first couple on Earth and how they are banished from paradise because of their disobedience.

**agnosticism** - The philosophical view that it is impossible to prove if gods exist, or the belief that it is unknown whether gods exist.

**agnostic atheism** - The philosophical view that gods do not exist, but if adequate proof were given, they would be believed.

**AIDS (Acquired immunodeficiency syndrome)** - A set of symptoms and infections resulting from damage to the immune system caused by HIV.

**alternative medicine** - Treatments that are not advocated by most doctors, but are claimed to be effective by supporters.

**Ambulocetus** - An early cetacean that lived during the Eocene epoch that could walk as well as swim. A transitional species from land mammal to sea mammal.

**androgen** - The generic term for any compound that stimulates or controls the development and maintenance of masculine characteristics in vertebrates by binding to androgen receptors.

**ape** - All primates belonging to the *Hominoidea* superfamily which includes gibbons, orangutans, gorillas, chimpanzees, and humans.

**Applied Kinesiology** - The belief and practice of using manual muscle-strength testing for medical diagnosis and a subsequent determination of prescribed therapy.

**Arab-Israeli Conflict** - About a century of hostilities between Zionists, Muslims, Christians, Druze, and others who claim ownership of Palistine.

**Archaeopteryx** - A species of extinct reptiles with feathers from the late Jurassic period.

**Arndt-Schulz rule** - A medically obsolete phrase from 1888 which states that, "*for every substance, small doses stimulate, moderate doses inhibit, large doses kill.*"

**astrological sign** - The sign given to someone depending on which section of the Zodiac (or equivalent) they were born during.

**astrology** - The study and belief that the movements of the planets and stars somehow affect entities on earth.

**atavism** - Evolutionary throw-backs, such as traits reappearing which had disappeared generations ago; tales on humans, legs on whales, etc.

**atheism** - The lack of belief in gods, or the philosophical view that gods do not exist.

**atom** - A basic unit of matter consisting of a dense, central nucleus of protons and neutrons surrounded by a cloud of electrons

**autism -** A spectrum of brain development disorders that are characterized by impaired social interaction and communication, and restricted and repetitive behavior, all starting before a child is three years old.

**automatic writing -** The process or product of writing that is not consciously written.

**Avogadro's constant/limit -** The number of elementary entities—usually atoms or molecules—in one mole.

**axiom -** Something that cannot be proven, but is considered true because it is self-evident.

**backmasking -** Audio that is played in reverse as a subliminal message.

**backscatter -** Objects in the background of a photograph that cause lens flares by reflecting or producing light.

**bacteria -** A kingdom of unicellular microorganisms that are alive and can be killed with antibiotics.

**BCE (Before Common Era) -** Regarding the Common Era time scale, indicates how many years before 1 CE.

**Bible -** The Christian holy book of scriptures containing the Old and New Testaments.

**Bible code -** The assumption that hidden messages can be found in the bible and that they have significant meaning.

**Bill of Rights -** The first ten amendments of the US Constitution.

**big bang -** The theory that the universe spontaneously expanded from a very small point in space about 13.7 billion years ago.

**burden of proof -** The duty of a claimant to prove their claim.

**°C (Celsius) -** A temperature scale, developed by Anders Celsius in 1742, based on water in standard atmosphere, where 0 °C is freezing and 100 °C is boiling.

**calcification -** The process of change into a stony or calcareous substance by the deposition of lime salt.

**Cambrian -** A geologic period from 542 to 488.3 million years ago.

**Casimir effect -** A physical force that arises spontaneously from a quantized field.

**CE (Common Era) -** A time scale like BC/AD, without references to religion. Created by Christians around 1615 CE, but now used primarily by secular groups.

**cell theory -** The theory that living things are composed of tiny biological units called cells as discovered by Robert Hooke in 1665 CE.

**cherem -** Excommunication from Judaism, also used by Jews to declare military annihilation on their enemies.

**Christian -** One who practices Christianity.

**Christianity -** A group of monotheistic, Abrahamic religions, based on Judaism, who follow the teachings of Jesus of Nazareth as dictated in the New Testament.

**claim -** An assertion of truth.

**claimant -** One who makes a claim and is therefore subject to the burden of proof.

**classic elements -** The ancient belief that all matter is composed of only a few elements like air, earth, fire, water. Various regions included other elements like metal, wood, æther, void, etc.

**cold reading -** Telling someone that vague or common descriptions apply specifically to them. Also, a blanket term including forms of warm reading.

**complementary medicine -** Alternative treatments that are used in conjunction with real medicine in hopes that they will help the real medicine work.

**conscious -** The mental state of being aware of what you're perceiving and doing.

**Constitution of the USA -** The framework of government and supreme law of the USA. Contains the Articles of the Constitution, the Bill of Rights, and all additional amendments.

**continental drift -** the slow movement of continents explained by plate tectonics.

**control -** A duplicate test subject in which the variable is not present.

**cosmic microwave background -** The remnants of the big bang that fills the universe and exist as electromagnetic radiation at about 2.7 K.

**cosmology -** The study of the universe in its totality, and by extension, humanity's place in it.

**Creation science -** The movement by Creationists to misuse scientific means to cast doubt on the scientific origins of the universe and attempt to prove Creationism. Now predominantly called Intelligent Design.

**Creationism -** The belief that the universe was created—especially by God.

**Crusade -** A series of wars began by Christian Europe to eradicate Muslims, pagans, Jews, non-European Christians, and various other political enemies of the Papacy ranging from 1059 to the 1400s.

**cubit -** An ancient unit for measuring length which is described as the distance from the elbow to the fingertip.

**deductive reasoning -** A form of reasoning that makes premises (which are assumed to be true) and uses those premises to create conclusions which must be true based on the premises. For example, if all people are mortal, and you are a person, then you must be mortal.

**deism -** The belief that a supreme natural god created the universe, and that religious truths can be arrived at through the application of reason and observation of the natural world.

**dendrochronology -** The study of tree ring samples.

**DNA (deoxyribonucleic acid) -** A nucleic acid based on a double helix of nucleotides that contains the genetic instructions used in the development and functioning of all known living organisms.

**Doppler effect -** The measurable change in the frequency of a wave (sound, light, water, etc.) as affected by the motion of the source of the wave. Discovered by Christian Doppler in 1842.

**double-blind -** A form of testing in which neither the subject or the operator knows the variable.

**dowsing -** A form of divination whose practitioners claim to be able to know the location of obscure items like gold, water, gemstones, etc., often through the use of a dowsing rod.

**dowsing rod -** A tool used by dowsers, often shaped like a "Y" or an "L". They are in high tension and are affected with the slightest movements; especially those caused by the ideomotor effect.

**dynamization -** The unproven homeopathic belief that a diluent can hold a charge or memory from whatever is succussed in it.

**ear candling -** The practice of putting a hollow candle into one's ear, and burning it with the belief that heat and negative pressure will suck earwax from the ear canal.

**electron -** A subatomic particle that carries a negative electrical charge. They are found in a cloud around the nucleus of an atom.

**empirical -** Pertaining to, derived from, or testable by observations made using the physical senses or using instruments which extend the senses.

**endocrine system -** A control system of ductless glands that secrete hormones which circulate via the bloodstream to affect cells within specific organs.

**endorphin -** Chemicals secreted by the pituitary gland that dull pain and produce a sense of well-being during exercise or excitement.

**energy -** A quantity that denotes the ability to do work.

**entropy -** A measure of the amount of energy in a physical system which cannot be used to do mechanical work.

**equator -** An imaginary circle around the Earth, equidistant from the two poles, dividing Earth's surface into the northern and southern hemispheres.

**equinox -** The time, occurring twice a year, when the Earth's tilt is equal to the sun so that day and night are equal length at the equator.

**erosion -** The result of having been worn away through friction as by a glacier on rock or the sea on a cliff face.

**ESP -** The supposed ability to sense things without using known senses.

**Establishment Clause -** The first of the religion clauses of the 1st amendment to the US Constitution that prevents the US from promoting religion by stating, "*Congress shall make no law respecting an establishment of religion*".

**ethics -** The philosophical study regarding the principles of right and wrong.

**ethnoreligious -** an ethnic group of people whose members are also unified by a common religious background.

**evolution -** The theory that, over time, a species will change to best fit its environment because of genetic mutations in reproduction guided by natural selection.

**exaptation -** The use of a biological structure or function for a purpose other than that for which it initially evolved.

**explicit atheist -** The conscious disbelief in one, many, or all gods.

**°F (Fahrenheit) -** A temperature scale, created by Daniel Gabriel Fahrenheit in 1724, based on water in standard atmosphere, where 32 °F is freezing and 212 °F is boiling. Used so that there is a 180° difference.

**facilitated communication -** The process by which a facilitator attempts to help subjects who are normally unable to communicate to do so, regardless of whether they are mentally capable.

**fact -** An objective consensus on a fundamental reality that has been agreed upon by a substantial number of people.

**faith -** A belief in something without evidence.

**false modesty -** A manipulation technique where the manipulator pretends to be bad at something so that other people's expectations are lowered making them more surprised when the manipulator succeeds.

**falsifiable -** Able to be proven wrong.

**first amendment -** The first amendment to the US Constitution which contains the Establishment Clause, the Free Exercise Clause; freedom of speech, of the press, and of assembly.

**first law of thermodynamics -** Known as the conservation of energy. It states that, "*The increase in the internal energy of a system is equal to the amount of energy added by heating the system, minus the amount lost as a result of the work done by the system on its surroundings.*"

**fishing -** A cold reading trick where one casts out random names and topics and waits for someone to take the bait and give you information about themself.

**flattery -** A manipulation technique where the manipulator gives someone compliments so that they will be less critical towards them.

**fossil -** Preserved remains or traces of animals, plants, and other organisms from the remote past.

**Free Exercise Clause -** The second of the religion clauses of the 1st amendment to the US Constitution. It is appended to the Establishment Clause and allows freedom of religion by stating, "*...or prohibiting the free exercise thereof.*"

**French Wars of Religion -** The period of civil infighting and military operations, primarily between French Catholics and Protestants from 1562 to 1598.

**forensic science -** Fields of study involving the collection of physical evidence and its subsequent analysis.

**fringe science -** Scientific inquiry on areas of study that are very different from established methods or ideals. Examples include immortality, cold fusion, alchemy, etc.

**garden of Eden -** The garden of paradise mentioned in the story of Genesis where Adam and Eve lived prior to eating from the Tree of Knowledge.

**general relativity -** Albert Einstein's 1916 theory of gravitation and curved spacetime which states that time slows in higher gravitational fields.

**germ theory -** A theory stating that microorganisms like bacteria, viruses, protozoa, and fungus are the cause of many diseases.

**glossolalia -** The Christian, especially Pentecostal, form of speaking in tongues as read in the book of Acts.

**God -** The omnipotent, omniscient, omnipresent spirit leader of Christianity, based off of Jewish Yahweh.

**gods -** Alleged spiritual beings with magical powers as believed by most world religions.

**Gospel -** The first four books of New Testament including Matthew, Mark, Luke, and John.

**graphology -** The belief that the way a person writes is affected by their personality.

**gravity -** The natural phenomenon by which objects with mass attract each other.

**half-life -** The length of time it takes for half of a substance to become inert.

**Hartle-Hawking state -** A wave function and vector used to figure out the origin of the universe.

**Heaven -** The alleged paradise where the souls of Christians supposedly go when their body's die.

**Hell -** The alleged place of fire and brimstone where the souls of non-Christians supposedly go to be tortured for eternity.

**HIV (Human immunodeficiency virus) -** A lentivirus that attacks the immune systems and can lead to AIDS.

**Holy Ghost -** The power of God manifested in spirit form as believed by Christians.

**homeopathy -** The unproven belief that harmful ingredients, when extremely diluted in water, can cure illnesses. Created by Samuel Hahnemann in 1807.

***Homo sapiens* -** The binomial nomenclature of humans.

**hot reading -** Getting information about someone covertly and then using that information as proof of mystic powers.

**humanism -** The philosophical belief that humans are capable of rationality and ethics without having to invoke supernatural causes.

**hypothalamus -** The part of the mammalian brain that links the nervous system to the endocrine system via the pituitary gland.

**hypothesis -** A tentative conjecture explaining an observation, phenomenon, or scientific problem that can be tested by further observation, investigation, and/or experimentation.

**Iberian Peninsula -** The area of Europe which includes Spain, Portugal, Andorra and Gibraltar and a very small area of France.

**ice age -** Any of several cold periods in the history of the earth marked by episodes of extensive glaciation alternating with episodes of relative warmth.

**ideomotor effect -** A psychological phenomenon that manifests itself in an involuntary movement caused by an idea or thought rather than sensory stimulation.

**implicit atheism -** The lack of a belief in gods without a conscious rejection of them.

**inductive reasoning -** A form of reasoning that makes generalizations based on experiences (e.g., I've only ever touched cold ice, therefore, I reason that all ice is cold).

**Intelligent Design -** The belief that the universe was created by an intelligent designer and the misuse of science in order to prove the ID agenda while attempting to disprove well-established science.

**intimidation -** A manipulation technique where the manipulator instills fear in their mark so that they'll do what the manipulator wants.

**iron-sulfur world hypothesis -** The hypothesis that life on Earth began in the form of chemical reactions with metal powered by underwater thermal vents. These reactions would create the building blocks of life.

**Islam -** A group of monotheistic, Abrahamic religions originating with the teachings of the Islamic prophet Muhammad.

**Jesus of Nazareth -** The primary prophet of Christians who believe he is the son of God.

**Jew -** One who practices Judaism.

**Jewish-Roman Wars -** A series of several Jewish revolts against the Roman Empire spanning from 66 to 613.

**jihad -** Arabic for "struggle", as in to struggle for Allah against oppressors of Islam, though not necessarily through violence.

**Jihad (violent) -** A series of wars, military campaigns, and battles fought by Muslims to defend or conquer for Islam.

**Judaism -** A group of monotheistic Abrahamic religions based off the beliefs of the ancient Hebrews as depicted in the Tanakh.

**junk science -** A pejorative used on a science that has a strong political or religious agenda making its authenticity dubious. Examples include research performed by oil companies contradicting global warming and tests performed by tobacco companies that doubt a link between smoking and cancer.

**K (Kelvin) -** A temperature scale, created by William Thomson, 1st Baron Kelvin in 1848, where 0 K is absolute zero.

**Kepler's laws of planetary motion -** Three mathematical laws composed by Johannes Kepler in 1605 which describe the motion of planets in the Solar System.

**Kelvin's statement -** A manner of stating the second law of thermodynamics as, "*It is impossible to convert heat completely into work in a cyclic process*."

**Ketuvim -** The third part of the Jewish Tanakh, consists of stories and songs.

**KJV (King James Version) -** An English translation based on earlier bibles authorized by the Christian church in 1611.

**law -** A well-established, observed physical characteristic or behavior of nature used for analysis. Often the foundation of a theory.

**law of similars -** The unproven homeopathic belief that illnesses are cured by chemicals that make healthy people sick with similar symptoms of the illness.

**law of susceptibility -** The unproven homeopathic belief that people are susceptible to miasms when they're in a negative state of mind.

**lentivirus -** A genus of slow viruses of the *Retroviridae* family (including HIV), characterized by a long incubation period and the ability to deliver a significant amount of genetic information into the DNA of the host cell.

**lie detection -** The attempt to determine whether someone is lying, often using machines or divination.

**light -** Refers to visible light in the electromagnetic spectrum (around 400–700 nm). The primary properties of light include intensity, frequency, and polarization. Light's ability to exhibit properties of both waves and particles is called wave-particle duality.

**Manifest Destiny -** The belief that, due to superior government, race, and religion, the United States was destined, or even ordained by God, to expand across North America.

**manipulation techniques -** Skills learned in order to manipulate people, such as flattery, intimidation, suggestion, and false modesty.

**mass -** The quantity of matter which a object contains, regardless of its bulk or volume.

**matter -** The basic structural component of the universe, usually with both mass and volume.

**medium -** A person who claims to be a communicator between the worlds of the living and dead or physical and spiritual.

**meridian -** A believed channel of flowing qi in Eastern medicine.

**miasm -** An alleged generic intangible illness caused by the vital forces of the human body being deranged.

**Milkhemet Mitzvah -** Hebrew for "war by commandment". Wars fought by Jews that were supposedly required by scripture in the Tanakh.

**mirror self-aware test -** Placing an animal in front of a mirror to see if it realizes that it is looking at itself. Those who are judged to recognize their reflection are deemed self-aware.

**Mitochondrial Eve -** The matrilineal most recent common ancestor for all currently living humans. Not to be confused with the biblical Eve.

**Modern Spiritualist Movement -** A surge in the belief of spiritualism, especially the ability to communicate with spirits, from the 1840s to the 1920s.

**mole -** The amount of substance of a system which contains as many elemental entities (e.g., atoms, molecules, ions, electrons). Coined by Wilhelm Ostwald in 1893.

**monotheism -** The belief that there is only one god.

**morality -** A code of conduct held to be authoritative in matters of right and wrong.

**Muslim -** One who practices Islam.

**mutation -** Incorrect copies that occur during DNA replication when nucleotides are not copied properly, causing changes in the development of the organism.

**N (Newton) -** A unit of force equal to the amount of force required to give a mass of one kilogram an acceleration of one meter per second squared—about the amount of force the Earth's gravity has on an apple.

**natural selection -** The theory that the more fit an animal is to live in its environment, the more likely it will live to produce offspring and pass on its genes, thereby speeding up evolution.

**naturalism -** The position that all things can be explained through natural means without invoking the supernatural.

**nervous system -** The bodily system which coordinates and monitors the activity of other bodily systems while processing input from the senses. Consists of the brain, the brain stem, the spinal cord, nerves, and ganglia.

**New Testament -** The more recent half of the bible containing stories of the life of Jesus, morality, and Armageddon.

**Newton's law of universal graviton -** A physical law describing the gravitational attraction between bodies with mass as discovered by Isaac Newton in 1687.

**Newton's laws of motion -** Three physical laws of motion created by Isaac Newton in 1687 which provide the relationships between the forces and motion of active bodies.

**neutron -** A subatomic particle found in the nucleus of atoms or unbound as free neutrons. They have no net electric charge and a mass slightly larger than that of a proton.

**Nevi'im -** The second part of the Jewish Tanakh, consists of stories allegedly written by profits of Judaism.

**Noah's Ark -** A story where a man named Noah builds an ark to save his family and all animals on Earth from a great flood caused by God.

**objective -** Based on observed facts; not influenced by personal emotion or ideals.

**occult -** Dealing with or related to the supernatural.

**Old Testament -** The first half of the Christian bible, based off of the Jewish Tanakh. Contains stories about the creation of the world and morality. Similar to parts of the Qur'an.

**omnibenevolent -** Being all-good or all-loving.

**omnipotent -** Having unlimited power or authority.

**omnipresent -** Being everywhere at once.

**omniscient -** Knowing all things.

**ontogeny -** the study of the physical development of an organism from conception to maturity.

**operator -** One conducting a scientific test.

**opinion -** A subjective thought formed by a person about a topic or issue.

**orb -** Backscatter that people attribute to supernatural phenomena.

**otoscope -** A medical device used to look into the ears to check for signs of illness.

**Ouija board -** A small board with letters and numbers printed on it used to allegedly communicate with spirits. First used in the late 1800s.

**paleontology -** The study of life existing in prehistoric or geologic times, especially as represented by fossils.

**particle -** Entities that make up matter and energy. They include the atomic constituents (protons, neutrons, and electrons), but also those found in energy like photons, fermions, bosons, quarks, and many more.

**pendulum -** A device composed of a weighted bob on a cord, often used for divination.

**perpetual motion -** The unproven idea that motion can be maintained in-definitely, usually in the form of a machine.

**philosophy -** A science that deals with existence, truth, ascetics, knowledge, language, justice, and logic.

**pituitary gland -** An endocrine gland at the base of the brain whose secretions control the other endocrine glands and influence growth, metabolism, and maturation.

**placebo -** A treatment with no actual benefit which, nevertheless, makes people feel better.

**placebo effect -** The measured psycho-logical effect when using a placebo.

**planchette -** A pointer used on Ouija boards.

**plate tectonics -** the large-scale movement of the tectonic plates in the earth's lithosphere that contributes to continental drift

**polygraph -** A machine that measures many things at once, often employed as a lie detector.

**polytheism -** The belief in multiple gods.

**prayer -** A way for religious people to allegedly commune with their deity.

**primate -** Any animal in the order *Primates*, including lemurs, the Aye-aye, lorids, galagos, tarsiers, monkeys, and apes (including humans).

**primordial soup -** The state of the world's oceans during the point in Earth's history when the life first began to develop.

**prime meridian -** The reference line at 0° longitude, passing through Greenwich, England, from which longitude east and west is measured.

**prion -** An infectious agent that, according to current scientific consensus, is comprised entirely of a propagated misfolded protein.

**proton -** A subatomic particle with a positive electric charge. It is found in the nucleus of an atom, but is also stable in a ionic form.

**proving -** Using harmful chemicals on healthy people and documenting their effect so they can be used in homeopathic tinctures.

**pseudoscience -** A study with very lax use of the scientific method that rarely subjects its hypotheses to rigorous tests, and because of this, is very difficult to reproduce. Often disregarded by most scientists because of these failures.

**psychic -** One who purports to have supernatural powers relating to ESP, telekinesis, mind reading, etc.

**qi -** The supposed "energy flow" in Eastern medicine. Similar to life force, breath of life, spirit force, prana, etc.

**quantum mechanics -** The study of mechanical systems whose dimensions are close to, or at, the atomic scale, such as molecules, atoms, and subatomic particles.

**Qur'an -** The primary holy scripture of Islam. Contains several sections that are similar to the Old Testament.

**radioactive beach hypothesis -** A hypothesis which states that early life could have been created on the beaches during the time when then moon was closer to Earth and had a stronger effect on it causing radioactive elements to combine more frequently and start chemical reactions to form the building blocks of life.

**radiometric dating -** A method of determining the age of objects or material using the decay rates of radioactive components.

**Reconquista -** A period of Muslim invasion and occupation of the Iberian Peninsula from 711 to 718 and the Christian recapturing from 718 to 1492. Spanish/Portuguese for "reconquest".

**red giant -** A luminous giant star of low or intermediate mass that is in a late phase of stellar evolution.

**redshift -** Occurs when an object that emits light is moving away from the observer, and the light frequency is shifted to the red end of the spectrum because of the Doppler effect.

**relativity -** A collection of Einstein's theories of special and general relativity.

**religion -** A system of beliefs based on faith, often including the existence of a soul, spirit, deity, or higher being.

**retrovirus -** An enveloped virus belonging to the viral family *Retroviridae*, that possesses an RNA genome which replicates via a DNA intermediate.

**RNA (ribonucleic acid) -** A type of molecule that consists of a long chain of nucleotide units similar to DNA.

**RNA world hypothesis -** A hypothesis which states that the first life on Earth began based on RNA before evolving into DNA.

**Rodhocetus -** An extinct whale genera that possess land mammal characteristics demonstrating the transition from life on the land to sea.

**Satan -** The embodiment of evil, temptation, and sin according to Christian folklore.

**secular -** Not relating to religion.

**science -** The collective discipline of study or learning acquired through the application of the scientific method to the natural world and the sum of knowledge gained from such methods.

**scientific method -** The foundation of science which consists of the collection of data through observation and experimentation, and the formulation and testing of hypotheses.

**Scientific Revolution -** A period of time, starting around 1543, when more scientists begin adopting the scientific method and the popularity and application of science grew.

**second law of thermodynamics -** Known as the universal law of increasing entropy which states that, "*The entropy of an isolated system which is not in equilibrium will tend to increase over time, approaching a maximum value at equilibrium.*"

**solstice -** The time, occurring twice a year, when the Earth's tilt is as far from the sun as possible and day or night is the longest of the year at the equator.

**soul -** The alleged immortal essence of a person beyond their physical qualities.

**Spanish Inquisition -** A Catholic tribunal in Spain from 1478 to 1834 which included the deportation, repression, or forced conversion of non-Catholics, and the humiliation, torture, and often execution of supposed heretics.

**special relativity -** Albert Einstein's 1905 theory regarding the structure of spacetime which states that the laws of physics are the same for all observers in uniform motion to each other and the speed of light in a vacuum is the same for all observers.

**species -** All the individual organisms of a natural population that generally interbreed at maturity in the wild and whose interbreeding produces fertile offspring. Also, all organisms with similar DNA.

**speciation -** The process by which new distinct species evolve.

**spontaneous generation -** The belief that living things spawn from putrid matter; e.g., rats and fleas from rotting carcasses

**statistically significant -** Occurring considerably more often than what would be expected by chance alone.

**stigmata -** The physical wounds or sensation of pain in the similar areas of crucifixion that Jesus supposedly suffered.

**stratum -** A layer of sedimentary rock with the same composition throughout.

**strong agnosticism -** The philosophical view that it is impossible for people to know whether gods exist.

**strong atheism -** The explicit belief that a god or gods do not exist.

**subconscious -** Existing or operating in the mind beneath conscious level.

**subject -** Who or what is being tested on in a scientific test.

**subjective -** That which is not directly verifiable by others.

**subliminal messages -** Alleged messages that are only noticed at a subconscious level.

**succussion -** The act of violently shaking water with an ingredient in an effort to cause dynamization.

**suggestion -** A manipulation technique where the manipulator convinces someone else that the manipulator's idea is actually their idea.

**supernatural -** Something that is not part of the natural realm.

**Tanakh -** Jewish scriptures consisting of he Torah, Nevi'im, and Ketuvim.

**taxonomy -** The science of finding, describing, classifying, and naming organisms and the name of the hierarchical system of classifications used therein.

**telekinesis -** The supposed ability to move things via supernatural means.

**theism -** The belief in a god or gods.

**theory -** A coherent statement or set of statements that attempts to explain observed phenomena. In science, a theory is the highest level a body of knowledge can attain.

**thermodynamics -** A branch of science started by Otto von Guericke in 1650 which explains the conversions between heat and other forms of energy.

**Thirty Years War -** The war fought largely as a religious conflict between Protestants and Catholics in the Holy Roman Empire from 1618 to 1648.

**Tiktaalik -** A genus of extinct lobe-finned fish from the late Devonian period, with many features akin to those of tetrapods.

**tincture -** An extract of plant material used as a medicine, usually with alcohol.

**Torah -** The first part of the Jewish Tanakh, consisting of stories of the creation of the world, the wrath of god, laws, and punishment.

**Tree of Knowledge of Good and Evil / Tree of Life -** Magical fruit-bearing trees in the story of the garden of Eden that give the eaters of their fruit a conscience and immortality respectively.

**Trinity -** In Christianity Holy Trinity represents the Father (God), the Son (Jesus), and the Holy Ghost combined as one God.

**Troubles in Northern Ireland -** Conflict due to the constitutional status of Northern Ireland between the Protestant Unionists and Catholic Nationalists from 1968 to 1998.

**vaccination -** The administration of antigenic material to produce immunity to a disease.

**vacuum -** A volume of space that is essentially void of matter, such that its gaseous pressure is much less than atmospheric pressure.

**vacuum energy -** Energy that spontaneously arises in a vacuum.

**variable -** Something which can change. In a clinical test, a variable is what is being tested.

**virus -** A sub-microscopic infectious agent that is unable to grow or reproduce outside a host cell.

**vitalism -** The unproven belief that illness is caused by a person's energy or soul being out of balance.

**warm reading -** Using the way a person looks, talks, and acts to determine information about them, often done subconsciously.

**weak agnosticism -** The philosophical view that the existence of gods is unknown, but not necessarily unknowable.

**weak atheism -** The explicit disbelief in a god or gods.

**weight -** The force on an object due to gravitational attraction.

**white dwarf -** A very dense small star composed mostly of electron-degenerate matter.

**witch hunt -** A search for witches and witchcraft, often involving moral panic, mass hysteria, and mob lynching, also legally sanctioned by many religions as witch trials. Popular as early as 1760 BCE and still popular in Africa and the Middle East.

**xenoglossy -** The supposed ability to speak a language which you are not familiar with.

**Y-chromosomal Adam -** The patrilineal human most recent common ancestor from whom all Y chromosomes in living men are descended.

**Yahweh -** One of the names of the god of Judaism.

**Zodiac -** A model of the horizon broken into 12 equal sections, each designated an astrological sign named after a constellation.