Informal Fallacies

by Theodore Schick, Jr. & Lewis Vaughn
from their 1995 book *How To Think About Weird Things*

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When we give reasons for accepting a claim, we are making an argument. The reasons we give are called the *premises* of the argument, and the claim they allegedly support is called the *conclusion.* If the premises are acceptable, and if they adequately support the conclusion, then our argument is a good one. If not -- the premises are dubious, or if they do not justify the conclusion -- then our argument is fallacious. A fallacious argument is a bogus one, for it fails to do what it purports to do, namely, provide a good reason for accepting a claim. Unfortunately, logically fallacious arguments can be psychologically compelling. Since most people have never learned the difference between a good argument and a fallacious one, they are often persuaded to believe things for no good reason. To avoid holding irrational beliefs, then, it is important to understand the many ways in which an argument can fail.

An argument is fallacious if it contains (1) unacceptable premises, (2) irrelevant premises, or (3) insufficient premises. Premises are *unacceptable* if they are at least as dubious as the claim they are supposed to support. In a good argument, you see, the premises provide a firm basis for accepting the conclusion. If the premises are shaky, the argument is inconclusive. Premises are *irrelevant* if they have no bearing on the truth of the conclusion. In a good argument, the conclusion follows from the premises. If the premises are logically unrelated to the conclusion, they provide no reason to accept it. Premises are *insufficient* if they do not establish the conclusion beyond a reasonable doubt. In a good argument, the premises eliminate reasonable grounds for doubt. If they fail to do this, they don't justify the conclusion.

So when someone gives you an argument, you should ask yourself: Are the premises acceptable? Are they relevant? Are they sufficient? If the answer to any of these questions is no, then the argument is not logically compelling.

Unacceptable Premises

Begging the Question

An argument begs the question -- or argues in a circle -- when its conclusion is used as one of its premises. For example, some claim that one should believe that God exists because the Bible says so. But when asked why we should believe the Bible, they answer that we should believe it because God wrote it. Such people are begging the question, for they are assuming what they are trying to prove, namely that God exists. Here's another example: "Jane has telepathy," says Susan. "How do you know?" asks Jill. "Because she can read my mind," replies Susan. Since telepathy is, by definition, the ability to read someone's mind, all Susan has told us is that she believes that Jane can read her mind because she believes that Jane can read her mind. Her reason merely reiterates her claim in different words. Her reason provides no additional justification for her claim.

False Dilemma

An argument proposes a false dilemma when it presumes that only two alternatives exist when in actuality there are more than two. For example, "Either science can explain how she was cured or it was a miracle. Science can't explain how she was cured. So it must be a miracle." These two alternatives do not exhaust all the possibilities. It's possible, for example, that she was cured by some natural cause that scientists don't yet understand. Because the argument doesn't take this possibility into account, it's fallacious. Again: "Either have your horoscope charted by an astrologer or continue to stumble through life without knowing where you're going. You certainly don't want to continue your wayward ways. So you should have your horoscope charted by an astrologer." If someone is concerned about the direction her life is taking, there are other things she can do about it than consult an astrologer. Since there are other options, the argument *ins fallacious*.

Irrelevant Premises

Equivocation

Equivocation occurs when a word is used in two different senses in an argument. For example, consider this argument: "(i) Only man is rational. (ii) No woman is a man. (iii) Therefore no woman is rational." The word *man* is used in two different ways here: in the first premise it means human being but in the second it means male. As a result, the conclusion doesn't follow the premises. Here's another example: "It's the duty of the press to publish news that's in the public interest. There is a great public interest in UFOs. Therefore the press fails in its duty if it does not publish articles on UFOs." In the first premise, the phrase *public interest* means the public welfare, but in the second, it means what the public is interested in. The switch in meaning invalidates the argument.

Composition

An argument may claim that what is true of the parts is also true of the whole; this is the fallacy of composition. For example, consider this argument: "Subatomic particles are lifeless. Therefore anything made of them is lifeless." This argument is fallacious because a whole may be greater than the sum of its parts; that is, it may have properties not possessed by its parts. A property had by a whole but not by its parts is called an *emergent* property. Wetness, for example, is an emergent property. No individual water molecule is wet, but get enough of them together and wetness emerges.

Just as what's true of the part may not be true of the whole, what's true of a member of a group may not be true of the group itself. For example, "Belief in the supernatural makes Joe happy. Therefore, universal belief in the supernatural would make the nation happy." This doesn't follow because everybody's believing in the supernatural could have effects quite different from one person's believing in it. Not all arguments from part to whole are fallacious, for there are properties that the parts and wholes share. The fallacy lies in *assuming* that what's true of the parts is true of the whole.

Division

The fallacy of division is the converse of the fallacy of composition. It occurs when one assumes that what is true of the whole is also true of its parts. For example: "We are alive and we are made of subatomic particles. So they must be alive too." To argue this way is to ignore the very real difference between parts and wholes. Here's another example: "Society's interest in the occult is growing. Therefore Joe's interest in the occult is growing." Since groups can have properties that are not had by their members, such an argument is fallacious.

Appeal to the Person

When someone tries to rebut an argument by criticizing or denigrating its presenter rather than by dealing with the argument itself, that person is guilty of the fallacy of appealing to the person. This fallacy is called *ad hominem,* or "to the man." For example, "This theory has been proposed by a believer in the occult. Why should we take it seriously?" Or: "You can't believe Dr. Jones's claim that there is no evidence for life after death. After all, he's an Atheist." The flaw in these arguments is obvious; an argument stands or falls on its own merit; who proposes it is irrelevant to its soundness. Crazy people can come up with perfectly sound arguments, and sane people can talk nonsense.

Genetic Fallacy

To argue that a claim is true or false on the basis of its origin is to commit the genetic fallacy. For example: "Jones's idea is the result of a mystical experience, so it must be false (or true)." Or: "Jane got that message from a Ouija board, so it must be false (or true)." These arguments are fallacious because the origin of a claim is irrelevant to its truth or falsity. Some of our greatest advances have originated in unusual ways. For example, the chemist August Kekulé discovered the benzine ring while staring at a fire and seeing the image of a serpent biting its tail. The theory of evolution came to British naturalist Alfred Russell Wallace while in a delirium. Archimedes supposedly arrived at the principle of displacement while taking a bath, from which he leapt shouting, "Eureka!" The truth or falsity of an idea is determined not by where it came from, but by the evidence supporting it.

Appeal to Authority

We often try to support views by citing experts. This appeal to authority is perfectly valid -- provided that the person cited really is an expert in the field in question. If not, it is fallacious. Celebrity endorsements, for example, often involve fallacious appeals to authority because being famous doesn't necessarily give you any special expertise. The fact that Dionne Warwick is a great singer, for example, doesn't make her an expert on the efficacy of psychic hot lines. Similarly, the fact that Linus Pauling is a Nobel Prize winner doesn't make him an expert on the efficacy of vitamin C. Pauling claimed that taking massive doses of vitamin C would help prevent colds and increase the life expectancy of people suffering from cancer. That may be the case, but the fact that he said it doesn't justify our believing it. Only rigorous clinical studies confirming these claims can do that.

Appeal to the Masses

A remarkably common but fallacious form of reasoning is: "It must be true (or good) because everybody believes (or does) it." Mothers understand this as a fallacy; they often counter this argument by asking: "If everyone jumped off a cliff, would you do it too?" Of course you wouldn't. What this shows is that

just because a lot of people believe something or like something doesn't mean that it is true or good. A lot of people used to believe that the Earth was flat, but that certainly didn't make it so. Similarly, a lot of people used to believe that women should not have the right to vote. Popularity is not a reliable indication either of reality or of value.

Appeal to Tradition

We appeal to tradition when we argue something must be true (or good) because it is part of an established tradition. For example: "Astrology has been around for ages, so there must be something to it." Or: "Mothers have always used chicken soup to fight colds, so it must be good for you." These arguments are fallacious because traditions can be wrong. This becomes obvious when you consider that slavery was once an established tradition. The fact that people have always done or believed something is no reason for believing that we should continue to do or believe something.

Appeal to Ignorance

The appeal to ignorance comes in two varieties: using an opponent's inability to disprove a conclusion as proof of the conclusion's correctness, and using an opponent's inability to prove a conclusion as proof of its incorrectness. In the first case, the claim is that since there is not proof that something is true, it must be false. For example: "There is no proof that the parapsychology experiments were fraudulent, so I'm sure they weren't." In the second case, the claim is that since there is no proof that something is false, it must be true. For Example: "Bigfoot must exist because no one has been able to prove that he doesn't." The problem with these arguments is that they take a lack of evidence for one thing to be good evidence for another. A lack of evidence, however, proves nothing. In logic, as in life, you can't get something for nothing.

Appeal to Fear

To use the threat of harm to advance one's position is to commit the fallacy of the appeal to fear. It is also known as swinging the big stick. For example: "If you do not convict this criminal, one of you may be her next victim." This is fallacious because what a defendant might do in the future is irrelevant to determining whether she is responsible for a crime committed in the past. Or: "You should believe in God because if you don't you'll go to hell." Such an argument is fallacious because it gives us no reason for believing that God exists. Threats extort; they do not help us arrive at the truth.

Insufficient Premises

Hasty Generalization

You are guilty of hasty generalization, or jumping to conclusions, when you draw a general conclusion about all things of a certain type on the basis of evidence concerning only a few things of that type. For example: "Every medium that's been investigated has turned out to be a fraud. You can't trust any of them." Or: "I know one of those psychics. They're all a bunch of phonies." You can't make a valid generalization about an entire class of things from observing only one -- or even a number of them. An

inference from a sample of a group to the whole group is legitimate only if the sample is sufficiently large and every member of the group has an equal chance to be in the sample.

Faulty Analogy

An argument from analogy claims that things which resemble one another in certain respects resemble one another in further respects. For example: "The Earth has air, water, and living organisms. Mars has air and water. Therefore Mars has living organisms." The success of such arguments depends upon the nature and extent of the similarities between the two objects. The greater their dissimilarities, the less convincing the argument will be. For example, consider this argument: "Astronauts wear helmets and fly in spaceships. The figure in this Mayan carving seems to be wearing a helmet and flying in a spaceship. Therefore it is a carving of an ancient astronaut." Although features of the carving may bear a resemblance to a helmet and spaceship, they bear a greater resemblance to a ceremonial mask and fire. The problem is that any two things have some features in common. Consequently and argument from analogy can be successful only if the dissimilarities between the things being compared are insignificant.

False Cause

The fallacy of false cause consists of supposing that two events are causally connected when they are not. People often claim, for example, that because something occurred after something else it is caused by it. Latin scholars dubbed this the fallacy of *post hoc, ergo propter hoc,* which means, "After this, therefore because of this." Such reasoning is fallacious because from the fact that two events are constantly conjoined, it doesn't follow that they are causally related. Night follows day, but that doesn't mean that day causes night. Suppose that ever since you wore crystals around your neck you haven't caught a cold. From this you can't conclude that the crystals caused you to stay healthy, because any number of other factors could be involved. Only if it has been established beyond a reasonable doubt that other factors were not involved -- through a controlled study, for example -- can you justifiably claim that there is a causal connection between the two events.

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The SEARCH Formula

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Our formula for inquiry consists of four steps, which we represent by the acronym SEARCH. The letters stand for the key words in the four steps

1. **State** the claim.
2. Examine the **Evidence** for the claim.

3. Consider **Alternative** hypotheses.
4. **Rate,** according to the **Criteria** of adequacy, each **Hypothesis.**

The acronym is arbitrary and artificial, but it may help you remember the formula's vital components. Go through these steps any time you're faced with an extraordinary claim.

Note that throughout this chapter we use the words *hypothesis* and *claim* interchangeably. We do so because any weird claim, like any claim about events and entities, can be viewed as a hypothesis -- as an explanation of a particular phenomenon. Thinking of weird claims as hypotheses is important because effectively evaluating weird claims involves essentially the same hypothesis-assessing procedure used in science.

Step 1: *State* the Claim

Before you can carefully examine a claim, you have to understand what it is. It's vital to state the claim in terms that are as *clear* and as *specific* as possible. "Ghosts are real" is not a good candidate for examination because it's vague and nonspecific. A better claim is "The disembodied spirits of dead persons exist and are visible to the human eye." Likewise, "Astrology is true" is not much to go on. Its better to say, "Astrologers can correctly identify someone's personality traits by using sun signs." Even these revised claims aren't as unambiguous and definitive as they should be. (Terms in the claims, for example, could be better defined. What is meant by "spirit"? What does it mean to "correctly identify someone's personality traits"?) But many of the extraordinary claims you run into are of this caliber The point is that before examining any claim, you must achieve maximum clarity and specificity of what the claim is.

Step 2: Examine the *Evidence* for the Claim

Ask yourself what reasons there are for accepting the claim. That is, what empirical evidence or logical arguments are there in the claim's favor? Answering this question entails taking inventory of both the quantity and quality of the reasons for believing that the claim is true. An honest and thorough appraisal of reasons must include:

1. *Determining the exact nature and limitations of the empirical evidence*. This means assessing not only what the evidence is but whether there are any reasonable doubts regarding it. You have to try to find out if it's subject to any of the deficiencies we've previously discussed -- the distortions of human perception, memory, and judgment; the errors and biases of scientific research; the difficulties inherent in ambiguous data. Sometimes even a preliminary survey of the facts may force you to admit that there really isn't anything mysterious that needs explaining. Or perhaps investigating a little mystery will lead to a bigger mystery. At any rate, attempting an objective assessment of the evidence takes courage Many true believers have never taken this elementary step.

2. *Discovering if any of these reasons deserve to be disqualified*. As we've seen, people frequently offer considerations in support of a claim that should be discounted. These include wishful thinking, faith, unfounded intuition, and subjective certainty. The problem is that these factors aren't reasons at all. In themselves, they can't provide any support for a claim.

3. *Deciding whether the hypothesis in question actually explains the evidence*. If it doesn't -- if important factors are left out of account -- the hypothesis is not a good one. In other words, a good hypothesis must

be relevant to the evidence its intended to explain. If it isn't, there's no reason to consider it any further.

Step 3: Consider *Alternative* Hypotheses

It's never enough to consider only the hypothesis in question and its reasons for acceptance. If you ever hope to discover the truth, you must also weigh alternative hypotheses and their reasons.

Take this hypothesis, for example Rudolph the Red-Nosed Reindeer -- Santa's funny, flying, furry headlight -- is real and lives at the North Pole. As evidence for this hypothesis we could submit these facts: Millions of people (mostly children) believe Rudolph to be real; his likeness shows up everywhere during the Christmas holidays; given the multitude of reindeer in the world and their long history, its likely that at some time a reindeer with flying capabilities would either evolve or be born with the necessary mutations; some people say that they have seen Rudolph with their own eyes. We could go on and on and build a fairly convincing case for the hypothesis -- soon you may even come to believe that we were on to something.

The hypothesis sounds great by itself, but when considered alongside an alternative hypothesis -- that Rudolph is a creature of the imagination created in a Christmas song -- it looks ludicrous. The song hypothesis is supported by evidence that's overwhelming; it doesn't conflict with well-established theory in biology (as the real-Rudolph hypothesis does); and, unlike its competitor, it requires no postulations about new entities.

This third step involves creativity and maintaining an open mind. It requires asking whether there are other ways to account for the phenomenon at hand and, if there are, what reasons there are in favor of these alternative hypotheses. This step involves applying step two to all competing explanations.

Its also important to remember that, when people are confronted with some extraordinary phenomenon, they often immediately offer a hypothesis involving the paranormal or supernatural and then can't imagine a natural hypothesis to account for the facts. As a result, they assume that the paranormal or supernatural hypothesis must be right. But this assumption is unwarranted. Just because you can't think of a natural explanation doesn't mean there isn't one. It may be (as has often been the case throughout history) that you're simply unaware of the correct natural explanation. As pointed out in Chapter 2, the most reasonable response to a mystifying fact is to keep looking for a natural explanation.

We all have a built-in bias that urges us to latch onto a favorite hypothesis and ignore or resist all alternatives We may believe that we needn't look at other explanations since we know that our favorite one is correct. This tendency may make us happy (at least for a while), but it's also a good recipe for delusion. We must work to counteract this bias. Having an open mind means being willing to consider any possibility and changing your view in light of good reasons.

Step 4: *Rate*, According to the *Criteria* of Adequacy, Each *Hypothesis*

Now it's time to weigh competing hypotheses and see which are found wanting and which are worthy of belief. Simply cataloguing the evidence for each hypothesis isn't enough. We need to consider other factors that can put that evidence in perspective and help us weigh hypotheses when there's no evidence at all, which is often the case with weird things. As discussed in Chapter 8, these potent factors are the criteria of adequacy. By applying them to each hypothesis, we can often eliminate some hypotheses right away, give more weight to some than others, and decide between hypotheses that may at first seem

equally strong

1 *Testability*. Ask Can the hypothesis be tested? Is there any possible way to determine whether the hypothesis is true or false? Many hypotheses regarding extraordinary phenomena aren't testable. This doesn't mean they're false. It means they're worthless. They are merely assertions that we'll never be able to know. What if we claim that there is an invisible, undetectable gremlin in your head that sometimes causes you to have headaches. As an explanation for your headaches, this hypothesis is interesting but trivial. Since by definition there's no way to determine if this gremlin really exists, the hypothesis is amazingly uninformative. You can assign no weight to such a claim.

2. *Fruitfulness*. Ask Does the hypothesis yield observable, surprising predictions that explain new phenomena? Any hypothesis that does so gets extra points. Other things being equal, hypotheses that make accurate, unexpected predictions are more likely to be true than hypotheses that don't. (Of course, if they yield no predictions, this in itself doesn't show that they're false.) Most hypotheses regarding weird things don't make observable predictions.

3. *Scope*. Ask How many different phenomena can the hypothesis explain? Other things being equal, the more it explains, the less likely it is to be mistaken. In Chapter 3 we discussed the well-confirmed hypothesis that human perception is constructive. As we pointed out, the hypothesis explains a broad range of phenomena, including perceptual size constancy, misperception of stimuli, hallucinations, pareidola, certain UFO sightings, and more. A hypothesis that explains only one of these phenomena (for example, the hypothesis that UFO sightings are caused by actual alien spacecraft) would be much less impressive -- unless it had other things in its favor like compelling evidence.

4. *Simplicity*. Ask Is this hypothesis the simplest explanation for the phenomenon? Generally, the simplest hypothesis that explains the phenomenon is the best, the one least likely to be false. *Simplest* means makes the fewest assumptions. In the realm of weird things, this is often a matter of postulating the existence of the fewest entities. Lets say you get into your car one morning, put the key in the ignition, and try to start the engine but find that it won't start. One hypothesis for this phenomenon is that the car battery is dead. Another is that a poltergeist (a mischievous spirit) has somehow caused your car not to start. The battery hypothesis is the simplest (in addition to being testable, able to yield predictions, and capable of explaining several phenomena) because it doesn't require postulating the existence of any mysterious entities. The poltergeist hypothesis, though, does postulate the existence of an entity (as well as assuming that the entity has certain capabilities and tendencies). Thus the criterion of simplicity shows us that the battery hypothesis has the greater chance of being right.

5. *Conservatism*. Ask Is the hypothesis consistent with our well-founded beliefs? That is, is it consistent with the empirical evidence -- with results from trustworthy observations and scientific tests, with natural laws, or with well-established theory? Trying to answer this question takes you beyond merely cataloguing evidence for hypotheses to actually assigning weight to hypotheses *in light of all the available evidence*. Other things being equal, the hypothesis most consistent with the entire corpus of our knowledge is the best bet, the one most likely to be true.

It follows that a hypothesis that flies in the face of extremely well-established evidence must be assigned a very low probability. Say, for example, that someone claims that yesterday thousands of cats and dogs rained down from the sky in Texas. This strange happening is logically possible, of course, but it conflicts with an enormous amount of human experience regarding objects that fall from the sky. Maybe one fine day cats and dogs will indeed tumble from the clouds and surprise us all. But based on a massive amount of experience, we must assign a very low probability to such a possibility.

What if someone claims to have built a perpetual motion machine, a device that, to work, must

successfully circumvent one of the laws of thermodynamics. (A perpetual motion machine is supposed to function without ever stopping and without needing to draw on an external source of power -- it supplies its own energy; this violates the law of conservation of mass-energy, which says that mass-energy can't be created or destroyed.) The laws of thermodynamics are supported by a massive amount of empirical evidence gathered throughout centuries. There have also been numerous failed attempts to build a perpetual motion machine. In light of such evidence, we're forced to conclude that it's very unlikely that anyone could avoid the laws of thermodynamics. Unless someone is able to produce good evidence showing that it can be done, we must say that the above claim is highly improbable.

Likewise, if someone puts forth a hypothesis that conflicts with a highly confirmed theory, the hypothesis must be regarded as improbable until good evidence shows that the hypothesis is right and the theory wrong. Paranormal claims then are, by definition, improbable. They conflict with what we know, with mountains of evidence. Only good evidence to the contrary can change this verdict.

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