

Junior
SKEPTIC ⁶²



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AN EASY GUIDE TO BALONEY DETECTION!



HELLO!

In this special issue of JUNIOR SKEPTIC we'll learn many valuable tricks for sorting truth from nonsense. We need them!

We're bombarded by claims every day of our lives. Friends tell us stuff. Labels and advertisements make claims about products. Books and websites make claims about the world. TV and YouTube channels show us amazing sights and tell us astonishing stories. But some of the things we hear sound too good to be true. How do we tell the difference between fact and baloney?

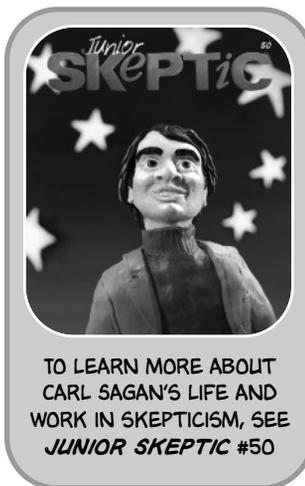
Let's find out!

SAGAN'S "FINE ART OF BALONEY DETECTION"

There was once a famous astronomer, book author, and TV star named Carl Sagan. He spent much of his life trying to teach the public about science—not just the cool things scientists have learned, but also the methods scientists use to find things out.

Sagan loved science, saying, "When you're in love, you want to tell the world." He thought every person deserved to share in the wonder of great scientific discoveries.

But Sagan was also frustrated to see people "bamboozled" by false claims. He didn't like seeing people get cheated by scammers or taught things that weren't true. He was convinced that people would get fooled less often if we all learned more of the thinking habits scientists use to solve problems.



TO LEARN MORE ABOUT
CARL SAGAN'S LIFE AND
WORK IN SKEPTICISM, SEE
JUNIOR SKEPTIC #50

He shared some of those methods for scientific thinking 30 years ago in an article called "The Fine Art of Baloney Detection," then expanded his thoughts in his book *The Demon-Haunted World*. Sagan wrote,

In the course of their training, scientists are equipped with a baloney detection kit. The kit is brought out... whenever new ideas are offered for consideration. ... What's in the kit? Tools for skeptical thinking.

Today we're going to put together our own baloney detection kits, starting with Sagan's top ten tips for thinking like a scientist. We'll learn what questions to ask when we hear weird things. We'll learn how to avoid getting fooled by sloppy or slippery arguments—and also learn how to avoid fooling ourselves!

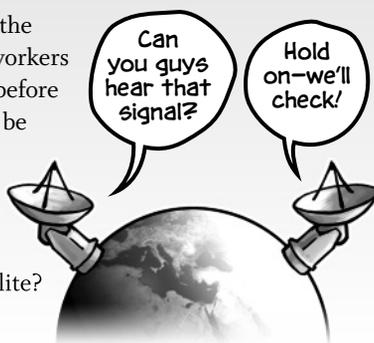
SAGAN'S TEN TOOLS FOR DETECTING BALONEY

(ADAPTED FOR YOUNGER READERS)

1 "FACTS" NEED DOUBLE-CHECKING

Sometimes when we look closely at a supposed "fact," it vanishes in a puff of smoke. That's because people make mistakes and assumptions—and sometimes make stuff up. Other people may repeat what they hear without checking. That's not a good idea. "Wherever possible," Sagan wrote, "there must be independent confirmation of the 'facts.'"

In some jobs it's *super* important to get the facts right. For example, several hospital workers may check and re-check a patient's name before they're wheeled in for surgery. It wouldn't be good to operate on the wrong person! Nurses, reporters, spies, and scientists all learn the habit of double-checking. Does that unusual radio signal come from deep space, or perhaps only from a nearby satellite? Scientists double-check!



2 ENCOURAGE DEBATE

"Making an argument" doesn't mean squabbling, but "presenting a case"—explaining why we think a certain thing and trying to convince others that we're right. But it's hard for most people to evaluate arguments about science or other complicated subjects. We just don't know enough to have informed opinions. We need people who do.

For this reason, Sagan said we should encourage serious "debate on the evidence by knowledgeable" people from "all points of view."

3 BEWARE OF ARGUMENTS FROM AUTHORITY

When someone tells us something must be true because a wise or important person *said* it's true, that's an "argument from authority." Such arguments "carry little weight," Sagan explained, because

"authorities" have made mistakes in the past. They will do so again in the future. Perhaps a better way to say it is that in science there are no authorities; at most, there are experts.

Experts are people who've studied a topic for a long time. They're more likely to have reliable knowledge about *that* topic, but not *every* topic. And even the most knowledgeable experts still make mistakes.

4 SPIN MORE THAN ONE HYPOTHESIS

"If there's something to be explained," Sagan advised, "think of all the different ways in which it *could* be explained." People often latch onto the first explanation that feels right without stopping to consider other possibilities. For example, a person who hears a strange noise in the night might suppose it is a ghost. But even if ghosts were real things, lots of *other* things cause noises. Could it be a burglar, or a cat, or the wind? Raccoons raiding the trash can? A television next door? If we consider many possible explanations—many "hypotheses"—we're less likely to overlook the correct one. The next step, Sagan said, is to "think of tests by which you might systematically disprove each of the alternatives." What's left after testing has a "much better chance of being the right answer than if you had simply run with the first idea that caught your fancy."

5 DON'T GET TOO ATTACHED TO YOUR OWN HYPOTHESIS

Science solves problems using a simple but a mighty one-two punch: *propose many possible explanations (hypotheses), but don't believe them until after they are tested.* It's essential to remember that every proposed explanation is just an interesting notion until evidence tells us whether it's right or wrong. "Try not to get overly attached to a hypothesis just because it's yours," Sagan warned. "Ask yourself why you like the idea. Compare it fairly with the alternatives. See if you can find reasons for rejecting it. If you don't, others will."

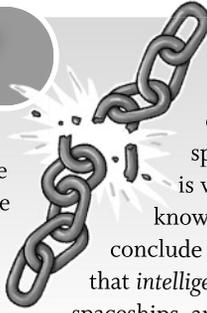
6 QUANTIFY (MEASURE AND COUNT) WHERE POSSIBLE

"If whatever it is you're explaining has some measure," Sagan advised, "some numerical quantity attached to it, you'll be much better able" to find a firm answer. Vague ideas are "open to many explanations," Sagan said. For example, imagine that Maya and Amelia were debating who has the best Lego collection. Well, "best" could mean anything. They could argue forever. But they could settle their debate if they compared a specific measure they could quantify. They could weigh their collections on a scale, for instance, or count their blocks or minifigures.

7

EVERY LINK IN A CHAIN OF ARGUMENT MUST WORK

People often string together several claims that are meant to add up to a conclusion: “If this, and because of that, we should conclude such-and-such.” But some chains have weak or missing links. They may include claims that aren’t true, or skip important steps. “If there’s a chain of argument, every link in the chain must work,” Sagan warned, “not just most of them.”



Consider this chain of argument: “The universe is vast beyond imagining. Aliens must exist! Therefore that light in the sky is an alien spaceship.” Well, the first link is solid. The second is weaker—there *may* be alien life, but we don’t know that yet. But then there are gaps in the chain. To conclude that the light is a spaceship, we’d need to show that *intelligent* aliens exist, and that they visit the Earth in spaceships, and that this *particular* light matches those ships.

8

MAKE USE OF “OCCAM’S RAZOR”

This is the odd name for a very handy and powerful problem solving trick. It’s a “convenient rule-of-thumb,” Sagan explained, that “urges us when faced with two hypotheses that explain the data *equally well* to choose the simpler.”

How is this “choose the simpler” guideline helpful? Occam’s Razor can’t tell us which explanations are *true*—we need evidence for that. But it gives us strong hints about which explanations are more *likely*. That helps us decide which possible explanations to investigate first.

Think of it this way. Any proposed explanation involves at least one “if”: “If such-and-such is true, that would explain this.” But some explanations are more iffy than others: “If this is true, and if this is also true, and if this other thing is true, that would explain this.” Explanations that rely on a whole bunch of “if” statements are less likely to be right, because every “if” is another chance for things to go wrong.

That’s not to say that simpler explanations are always right! The world can be awfully complicated, after all. Sometimes we need complex explanations to understand complex things. But it’s best to start simple and then follow the evidence from there.



9

ASK: IS THERE ANY WAY THIS IDEA COULD BE PROVEN FALSE?

Some claims can’t be proven one way or the other. “Love is like a rose.” “Purple is better than green.” “There’s an undetectable dragon in my garage.” Science ignores those sorts of claims. To count as a scientific hypothesis, a claim must be testable (even if we can’t test it right now) and “falsifiable”—there must be some conceivable way to gather evidence that would tell us if the claim is not true.

“You must be able to check assertions out,” Sagan said. Claims that can’t be tested or falsified “are not worth much.” He gave an example: “Consider the grand idea that our Universe” is just a tiny subatomic particle “in a much bigger Cosmos. But if we can never acquire information from outside our Universe,” could this idea ever be disproven?

10

RELY UPON CAREFUL EXPERIMENTS

Imagine we’re trying to solve a scientific mystery—to explain something we’ve observed in nature. If we remember Sagan’s advice, we first check the facts, then think of many possible testable explanations. We use Occam’s Razor to decide which explanations are the most likely. That’s a great start!

But we still need evidence if we want to solve the case. Evidence comes from observations and experiments. As Sagan explained, “The reliance on carefully designed and controlled experiments is key. We will not learn much from mere contemplation.” How do we decide among several possible explanations? “We don’t,” Sagan said. “We let experiment do it.”

SHERMER'S BALONEY DETECTION QUESTIONS

(ADAPTED FOR YOUNGER READERS)

Not everything that sounds “sciencey” truly is scientific. People sometimes use scientific-sounding language to promote non-scientific or nonsensical claims. This is known as “pseudoscience” (fake or imitation science). How can we tell the difference between genuine science and baloney in disguise? Inspired by Carl Sagan, the Skeptics Society published many useful tips in our 2001 *Baloney Detection Kit* booklet, including these questions suggested by SKEPTIC publisher Michael Shermer.

HOW RELIABLE IS THE SOURCE OF THE CLAIM?

Before we believe an amazing claim (and before we pass the claim along!) we should check that it comes from a careful, honest, knowledgeable source. Most of us know someone who is prone to exaggerating or making up fibs. Some websites are just as prone to publishing false or misleading stories. (We’ll come back to that problem later in this article.) We should look for the sources most likely to know what they’re talking about: trained experts with experience studying that specific topic. “Scientists are usually reliable; pseudoscientists unreliable,” Shermer pointed out.

Wow! This says Obama's secretly a *space squid!*



I better *share this* with everyone right away!



This says Obama's a "space squid"...?



How reliable is this website? I think I'll *check what other sources say...*



DOES THIS SOURCE MAKE MANY SIMILAR CLAIMS?

Shermer noted that some people have a frequent habit of “going well beyond the facts” to promote *many* bogus or questionable claims. When “one individual makes numerous such claims it is a sign” that they probably aren’t very reliable. It’s another warning sign when one far out claim includes *other* far out claims. “I saw Bigfoot” is a doubtful claim. “I saw Bigfoot a dozen times” is *super* doubtful. “I saw psychic Bigfoot climb out of a flying saucer” is a claim so outrageously doubtful that it almost *has* to be hogwash.

DO THEY USE ACCEPTED RESEARCH METHODS?

Another way to recognize fake science, Shermer advised, is to ask whether these researchers use accepted scientific research methods, “or have these been abandoned in favor of others that lead to the desired conclusion?” For example, homeopathic “medicines” contain no medicine. So it’s not surprising that scientific medical studies find that homeopathy is useless for treating any illness. However, homeopaths don’t bother with scientific tests. Instead, they use an unreliable “proving” process that convinces them that their potions have powerful healing powers science can’t detect.

HOW DOES THIS FIT WITH WHAT WE KNOW ABOUT THE WORLD AND HOW IT WORKS?

The saying “anything is possible” echoes an idea at the heart of scientific thinking: open mindedness. We don’t want to let preconceived ideas get in the way of considering claims fairly! Some weird claims turn out to be true, after all.

So it’s good to be open minded. But it’s also good to understand that some “possibilities” are less *plausible* or realistic than others. Scientists have been investigating nature for a couple of centuries. They’ve learned a lot about how the world works. Claims that fit well with that scientific knowledge are more believable than claims that don’t.

If I told you I could juggle, you’d be open minded. You know that juggling happens. However, you’d be much more skeptical if I said I could shoot lasers out of my eyes like Superman or the X-Men character Cyclops. You might still make an effort to be open minded about the possibility that I have a comic book superpower. But you would also know it’s unlikely *because that’s not how eyes work*. You would not accept my laser eyes claim without very strong evidence.

There’s another saying that reminds us to be cautious: “Extraordinary claims demand extraordinary evidence.”



DO MANY LINES OF EVIDENCE LEAD TOWARD THIS IDEA, OR TOWARD ANOTHER EXPLANATION INSTEAD?

Many scientific mysteries are too big to be solved by any one experiment or observation. Scientists must follow many lines of evidence, searching out one clue after another. It's a good sign when different lines of evidence lead in the same direction. But if some of the evidence points somewhere else, it's a sign that a different explanation may be needed.

Consider the greatest mystery ever solved: the origin of species. We now know that living things *evolve*. But people studied nature for centuries before they found enough clues to crack the case. "No one fossil, no one piece of biological or paleontological evidence has 'evolution' written on it," Shermer explained. Instead, thousands of clues slowly added

up to reveal the "story of the evolution of life." Rock layers showed us that our world is very old, and that different species existed in different periods of the Earth's history. Fossils showed us that living things change over time. Animal breeding showed us how changes accumulate. Today, DNA studies confirm that all living things are related. All lines of evidence led to the same conclusion.

By contrast, the hypothesis of a worldwide flood was once proposed to explain the features of the Earth's surface. But most evidence pointed in other directions. Scientists learned that many natural processes shaped the Earth's surface, including glaciers, erosion, and the movements of continents.



IS THIS CONCLUSION BASED ON PERSONAL BELIEFS?

If we want to find out what's true, it's important to try to set aside our own beliefs and let evidence lead the way. Scientists have tools to help them do that, such as testing by experiment and inviting other scientists with differing points of view to check their work. But it's still all too easy to be misled by our own beliefs.



My research proves chickens are the *smartest* animals! Also the best looking.

We often hear claims promoted by people who really, really *want* those claims to be true. We should be skeptical when people's conclusions just happen to match their own personal beliefs. It doesn't mean they *are* wrong. But it's a good reason to suspect that they *might* be.



HAS ANYONE TRIED TO DISPROVE THIS CLAIM?

It's easy to get fooled if we only look for evidence that a claim is true. For example, suppose someone were to claim you're a giant panda. They could say, "Well, pandas have two ears and two eyes. How many ears and eyes do you have? Aha! Two of each. That's evidence in favor of my panda hypothesis." Well, yes, it is, but it's very weak evidence that leads to a very silly conclusion. A more useful approach would be to ask, "What would we see if you are *not* a panda?" (You might not be black and white, or furry, or fond of munching bamboo—unless you are a panda?)

Trying to prove a claim *wrong* is often the very best way to find out if it's *right*.



DOES THIS PERSON PROVIDE EVIDENCE FOR THEIR EXPLANATION, OR JUST ATTACK OTHER EXPLANATIONS?

Shermer explained that this is a "classic debate strategy—criticize your opponent" without ever clearly saying what you believe "in order to avoid criticism." He added that this is "unacceptable in science." Claiming there are flaws in one explanation does not prove that your explanation is better. You need to present evidence of your own.

Some fringe claims frequently use this dodgy debate strategy. Consider conspiracy theories. A "conspiracy" is when a group of people work together to do something bad in secret. Conspiracies do really happen. Crooks bribe police officers. Politicians pass laws to help wealthy friends. Spies conspire to steal another country's secrets. Happily,

some conspiracies are exposed when reporters or law enforcement find evidence of their secret shenanigans.

A "conspiracy theory" is when someone claims *without good evidence* that a conspiracy must have happened. For example, there are people who claim that the Moon landings were faked. (They weren't. See JUNIOR SKEPTIC #11.) Those people never present evidence such as behind-the-scenes photographs, secret documents, or witnesses to the hoax, because no such evidence exists. Instead, they try to poke holes in "the official story." For example, they say that some of the photographs taken by astronauts on the Moon appear to them to be weird or suspicious.

HOW NOT TO GET FOOLED (EVEN BY YOURSELF)

AVOIDING SLOPPY ARGUMENTS AND COMMON THINKING MISTAKES

We've already put some powerful critical thinking tools into our baloney detection kits. Carl Sagan's advice helps us to think more like scientists. Michael Shermer's questions help us to unmask baloney disguised as science.

The next step is to learn more about the ways thinking can go wrong. This will help us to recognize slippery, misleading arguments that might otherwise fool us. And it will

help us to notice when we ourselves make the same kinds of mistakes—because everyone does from time to time!

We humans are a clever bunch. But we're quirky, and not always terribly logical. We believe things that feel good. We don't much like changing our minds. Sometimes we care more about "winning" debates than carefully working to discover the truth. Let's see how that happens.



IT DOES NOT FOLLOW

We've looked at some ways a chain of argument can fall apart, such as having weak or missing links. But the most obvious way for an argument to go wrong is simply not to make sense.

Consider this argument: "All men are mortal. Socrates is a man. Therefore Socrates is a platypus." Doesn't quite add up? This is what's called a "non sequitur," which is a Latin phrase meaning "it does not follow." Some arguments include pieces that don't fit, or jump to conclusions that don't have any connection to the rest of the argument. And this isn't always as easy to spot as an out-of-place platypus.

Here's an example more like something we might hear in real life: "This product is all natural! Take it to boost your immune system." But those two pieces have nothing to do with each other. Saying it's "all natural" does not lead to any conclusion about your immune system. Granite boulders and rattlesnake venom are all natural, but they won't improve your health. (Never put boulders in your body!)



ATTACKING A STRAWMAN

When people argue that another person's ideas are wrong, they should be careful to describe those ideas accurately. This doesn't always happen. Sometimes people will choose to debate an exaggerated version of the other person's ideas, or even pretend the other person believes things they don't actually believe.

Imagine I said "Ghost claims are not supported by scientific evidence," and a ghost hunter replied, "You think science knows everything!" Well, that's not what I said. I'd be silly if I believed that. Science doesn't know everything—not even close.

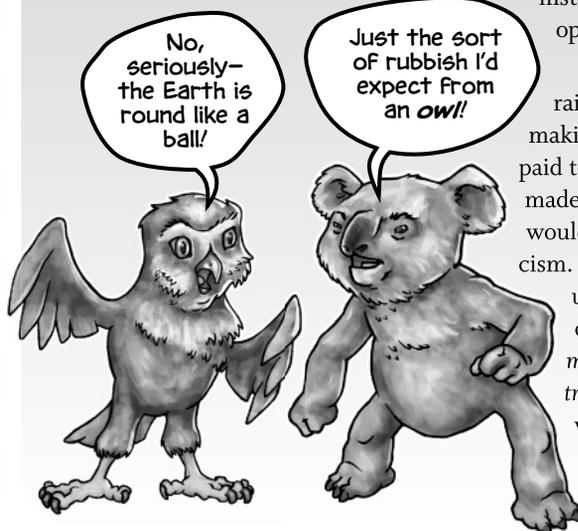
This is called "attacking a strawman." My opponent is debating something that sounds a bit like my idea, but isn't (in much the same way that a scarecrow looks a bit like a person, but isn't). This mistake is tempting because the strawman version of an idea can usually be torn apart as easily as a scarecrow.



ATTACKING THE PERSON

People sometimes choose to criticize their opponent's *character* or personal background instead of fairly debating their opponent's *ideas*.

It is not always a mistake to raise questions about the person making a claim. If they're getting paid to promote this claim, or have made false claims in the past, those would be good reasons for skepticism. But it's a dirty trick to bring up information that makes an opponent look bad *if that information has nothing to do with the truth of their claim*. It's a sneaky way to make their claim sound less believable, but it does not show that they're wrong.



PERSONAL INCREDULITY

Some claims sound too surprising or bizarre to believe. It's tempting to say, "That's ridiculous! I don't see how that can possibly be true!" This is a mistake because a claim can be true even if we don't understand or believe it. Simply rejecting a claim does nothing to prove that it's wrong.

This mistake is silly, but also common—and easy to make. (This was my reaction when I heard some of the weird but true discoveries of modern physics.)



"NOT PROVEN FALSE" DOES NOT MEAN "TRUE"

Some people assume that their paranormal claim must be true if it hasn't been proven false. "There was no sign of cheating when this psychic demonstrated mind-reading," one might claim for example, or "after all these years, authorities still can't prove aliens aren't visiting the Earth."

This kind of argument can sound vaguely convincing, but it's a thinking mistake called "arguing from ignorance" (lack of knowledge or evidence). A lack of evidence *against* something is not the same as evidence *for* that thing. We have no evidence that there are no space penguins. That doesn't even begin to suggest that space penguins exist. You can make the same argument about anything. No one can prove that Pokémon never attend tea parties in Wonderland. That doesn't mean they do.



YOUR CLAIM? YOUR BURDEN OF PROOF

When someone makes a claim, it's up to them to explain why anyone should believe it. It's a mistake for the person making the claim to try to shift this burden of proof to others.

Imagine someone were to tell you he can turn himself invisible, but he can't show you right now. That's already a claim that's hard to take seriously. Obviously it would be ridiculous for him to also then demand, "Prove me wrong if you don't believe me!" Why would you bother trying to prove anything? You'd probably just shake your head and try to get out of the conversation.

Such misguided demands are often heard in paranormal debates: "Skeptics say there's no Bigfoot. It's up to them to prove it!" Well no. It isn't.



"UNEXPLAINED" DOES NOT MEAN "UNEXPLAINABLE"

When people hear that a sighting or event is "unexplained," they may make the mistake of assuming it cannot be explained and so must be paranormal. But *everything* is unexplained until we find the explanation. Unsolved mysteries are just that—mysteries we still need to solve. As Michael Shermer points out, "it is okay to say, 'We do not yet know, but someday perhaps we will.'"

In some cases the mystery is solved, but we don't personally know the answer. Who built the pyramids? How is it possible for people to walk barefoot over red hot coals? Well, how does a magician do her tricks? She knows. Other magicians know. It only seems mysterious if we haven't learned enough about that subject.

Those who assume that unexplained things are paranormal also make a second mistake: they think that because they *don't* know the explanation, therefore they *do* know the explanation. People often reason like this (as pointed out in a skeptical book written over a century ago): "If it is not _____, what is it? We do not know. Therefore, it is _____." People fill in the blanks with whatever paranormal notions they happen to believe. If a person can't identify that flying object, for example, they may suppose that its identity must be "alien spaceship." That's like saying "I have no idea what's in this gift-wrapped present, so it must be a genie."

When we don't have enough information to solve a mystery, it's best to just say that. It's unwise to guess or jump to conclusions!



MAKING EXCUSES FOR FAILURES

Shermer points out that in science, "failures are how we get closer to the mark of truth." Scientists test things. If the result of their test is negative—say the experimental medicine did nothing—then they've learned something they didn't know.

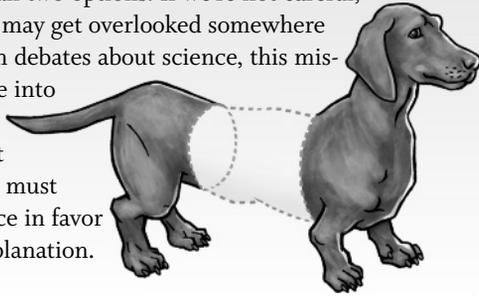
In the realm of paranormal claims, it's much less common for people to learn from failures. For example, many so-called psychics have been caught red handed using trickery to fake psychic powers. But exposed cheating does not usually shake the faith of the psychic's supporters. Instead they make excuses. "If the psychic did resort to trickery just this once," they might claim, "she must have been too tired to use her genuine powers."

Excuses are especially common when paranormal claims fail formal scientific tests. Perhaps psychic powers don't work when the psychic is watched too closely, or when there are skeptics in the room? Perhaps a laboratory environment somehow disrupts the energies necessary for this miracle cure? Such excuses are understandable. No one likes being disappointed. But if we're not willing to learn from the results of scientific tests, why bother with testing at all?



THINKING THERE ARE ONLY TWO CHOICES

People often suppose things are either one way or the other—either black or white, good or bad, us or them. This is a mistake called “excluding the middle” or “false dichotomy” (falsely dividing into two extremes). In reality, there are usually more than two options. If we’re not careful, the best answer may get overlooked somewhere in the middle. In debates about science, this mistake fools people into thinking that evidence against one explanation must count as evidence in favor of their own explanation.



"HAPPENED WITH" MAY NOT MEAN "CAUSED BY"

We’re all quite good at recognizing cause and effect. You kick a ball. It flies across the yard. You understand that your kick *caused* the ball to move.

But the cause of things is not always so obvious. When two things happen alongside each other, they may or may not be related. There are three main possibilities: one thing may cause the other, or the timing may be a coincidence, or a third thing may cause both. Here’s a famous illustration of that last possibility: when ice cream sales rise, drowning accidents also rise. The two things tend to go together, but neither causes the other. Instead, warm weather causes people to swim more and also to eat more ice cream.



"AFTER THIS" DOES NOT ALWAYS MEAN "BECAUSE OF THIS"

Our ability to recognize cause and effect is sometimes too good. When one thing happens after another thing, we often suppose that they must be related—even when they aren’t. This causes an incredible amount of mischief.

In the 1990s, for example, a few individuals noticed vapor trails from jets flying high overhead, and then noticed that they felt ill. They jumped to the extremely unlikely conclusion that these two things were related. This started a bizarre conspiracy theory about thousands of jets secretly spraying poison all over our planet.

When we think about health and medicine, it’s all too easy to imagine cause and effect relationships that don’t really exist. If you felt sick and someone gave you a pill, you might feel a little better right away, and much better after a

few days. Perhaps you’d recommend the pill to others: “It worked for me!” But did it? People often imagine feeling better when they’re given a “placebo” (fake medicine that does nothing, such as a sugar pill). And people usually do recover from illness on their own after a while.

Whether it’s a new drug, an ancient herb, or a magical healing ritual, feeling better after taking a treatment does not necessarily mean that the treatment did anything. To find out, scientists divide patients into two groups. Half get the treatment; half get a placebo. Neither the doctors nor patients know who is in which group until the end of the study. Then the two groups are compared. If the patients who received the treatment did better than those who got a placebo, the treatment probably caused the difference. Scientific tests often reveal that popular “alternative medicine” treatments do nothing at all. Millions of people are fooled by “after this, therefore because of this” reasoning.



COINCIDENCES HAPPEN

It’s a busy world, bustling with an uncountable number of daily events and goings on. Every once in a while, completely unrelated things will coincide in a such a way that we notice and find it remarkable. Such coincidences are inevitable and common, purely by accident. But as Shermer notes, these can seem more meaningful than they are:

When our mind makes a connection that seems improbable, there is a tendency to think something mysterious or paranormal is at work. You go to the phone to call your friend Bob. The phone rings and it is Bob. You think, “Wow, what are the chances? This could not have been a mere coincidence. Maybe Bob and I are communicating telepathically.”



Is this as unlikely as it seems? We often think of the many people in our lives.

Sometimes they call. Most of the time they don’t phone soon after we thought about them, but it’s likely that one of them will eventually. We notice and remember surprising coincidences. We don’t pay attention when nothing remarkable happens. We certainly don’t keep track of all the times we thought of someone and they *didn’t* call us!



THE INSIDIOUS PROBLEM OF "CONFIRMATION BIAS"

We've looked at many ways our thinking (and arguments) can go wrong. But here's the big one, the king of mistakes, the most widespread and deceptive thinking problem of them all: every single one of us is *much more open to evidence that confirms what we already believe*—and we *dismiss evidence that would require us to change our minds*. This tendency is called "confirmation bias."

Built for Belief

Human beings are absolutely terrific at *believing* things. It seems we can believe almost anything! Some people are truly convinced that the Earth is as flat as a pancake. Others believe that the world's scientists are conspiring (for some reason) to deceive everyone about evolution and climate change. But the evidence for a spherical Earth, global warming, and evolution through natural selection is overwhelming. To believe otherwise takes more than incorrect ideas. It takes mental effort. And our brains are built to do that work all the time without our even noticing.

Our brains maintain our beliefs by filtering what we see and hear. When new information fits with what we already

believe to be true, we pay attention and think, "That sounds right." When information conflicts with our beliefs, we ignore it, dismiss it, or view it with suspicion.

This is actually pretty helpful much of the time. We can't change our minds with every new claim. It makes sense to check new information by comparing it with what we already know. Sure, our friend was a jerk last Tuesday, but we know she's usually loyal and kind. Yes, the ice looks safe for skating, but we know it's best to be careful all the same.

But this automatic filtering becomes a big problem when it fools us into dismissing important new information. When we're shown strong evidence that our beliefs are incorrect, we should change our minds. But we usually don't. Instead, we tend naturally to invent excuses to reject that new evidence—"that's all part of the conspiracy," say, or "they *would* claim that," or "just another bogus study."

It's human nature. But we can take steps to avoid fooling ourselves this way. We've taken one already: we learned that confirmation bias exists. Step two is to remember that! Step three is harder: we need to make an ongoing effort to be skeptical about claims we want to agree with, and to pay open-minded attention to claims we're tempted to dismiss.

THIS FILTERING HAPPENS IN ALL PARTS OF OUR LIFE. SUPPOSE EMILY BELIEVES PENELOPE IS A POLITE FRIENDLY PERSON, AND BELIEVES OLIVIA IS AWFUL. THOSE BELIEFS WILL INFLUENCE EMILY'S INTERPRETATION OF NEW INFORMATION. SHE MAY ALSO OVERLOOK OR FORGET THINGS THAT COULD CHALLENGE HER OPINIONS.



NAVIGATING THE NEWS AND ONLINE MEDIA



MAJOR TYPES OF MISLEADING, JOKE, AND FAKE NEWS

Every day, reporters and news editors work to provide accurate, factual information about local and global events. Their hard work exposes wrongdoings and protects the public and our freedoms. Good journalism helps us to understand our world so we can make smart choices.

And yet, we still shouldn't believe everything we're told! Newspapers, television, websites, social media, and YouTube channels can all inform us, but they can also sometimes mislead. Let's learn to recognize some categories of "news" that may spread misinformation or deceive the public.

Rumors

The most primitive form of news is gossip or rumor—tales people tell us in person, or share by email or social media such as Twitter or Facebook. We all know rumors aren't very reliable. Yet we often believe things people say they heard from someone or read someplace. Urban legends are shared widely and sometimes printed as news. Instead of repeating rumors, we should pause and check the facts.

April Fool's Jokes

There's a tradition to publish joke news stories on April 1st. These aren't usually meant to deceive (or not to deceive for long, anyway). Most are written as obvious jokes. Some are harder to spot. If a story seems too good to be true, check the date! If it says April 1st, it's almost certainly baloney.

Satirical News or News Parodies

News parodies imitate the style and appearance of news for the purposes of comedy. Well-known examples include the Onion.com, which publishes joke stories resembling news ("Moon Finally Hatches") and television's *The Daily Show*, which uses real news stories as the basis for jokes. But countless other sources also publish parody news stories. Most of these are unfamiliar to unsuspecting readers, so they're often taken seriously and shared online.

Tabloids

"Tabloids" are papers with a reputation for publishing many sensational stories of questionable reliability (especially celebrity gossip). Tabloids should be read skeptically.

"Clickbait"

News sources may use sensational headlines to lure online readers into "clicking" on those stories. The more clicks, the more advertising money! Sensational headlines can mislead us even if the rest of the story is accurate and told responsibly. One handy rule of thumb: when headlines

ask provocative questions ("Are Mermaids Real?") the answer tends to be "no."

Editorials and Opinion Pieces

Traditional news sources divide their stories into distinct types. Reporting tries to describe the facts from a neutral point of view. Editorial and opinion pieces ("op-eds") are allowed to take sides. Editorials and op-eds are usually labelled that way, but readers may overlook the labels.

Claims in Advertising and Politics

Companies promote products to make money. Some advertising claims are true; others may be false or misleading. Likewise, politicians boast and sometimes fib about themselves and their policies. Governments tell whoppers on occasion, which may be repeated by news media. It's smart to be skeptical whenever anyone tells you how great they are!

"Advertorials"

Some advertisements are presented in the style of news stories, then slipped in between real news articles. These are usually labelled as "paid content," but readers don't always realize that they're reading ads disguised as news.

Inaccurate Reporting

Sometimes reporters simply get things wrong. The first details of breaking stories are often incorrect, and must be updated when reporters get better information. Never accept the first article you read as the whole story. Follow the story for a while. See what other news sources say.

Biased Reporting

Some news sources have a clear "bias"—an ongoing prejudice in favor of one side of something, such as a certain political party. These may mislead us by telling one-sided stories, and by selectively choosing to promote some stories and downplay others.

Deliberately Deceptive Fake News

It's rare today for mainstream news to publish completely invented stories, but hoaxes do happen. (For some outrageous examples, see Junior Skeptic #56 and 59.) A bigger problem: websites designed to deceive readers into sharing fake news stories. These copy the style and even the logos of respected real news organizations, making it as difficult as possible for readers to tell they've been duped. But once you know these sites exist, you can be on guard. Watch for weird web addresses (such as ".com.co" instead of ".com"). Google the warning lists of fake news sites published by fact-checking organizations. And above all, remember to use the critical thinking tools in your baloney detection kit!

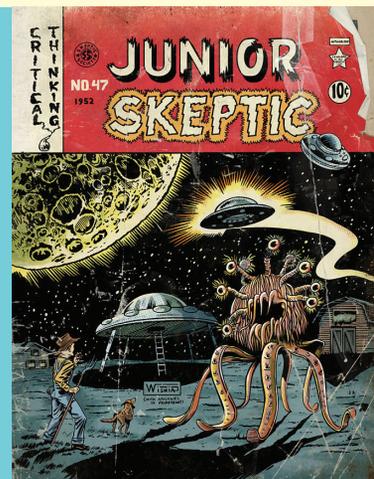
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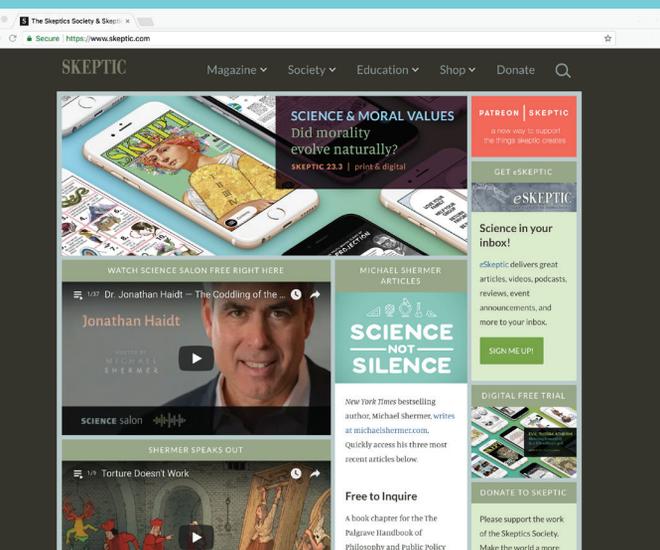
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