

Baloney Detection Kit

Student Handout

Anecdotes are not evidence

Pseudoscientists often submit anecdotes or second hand stories as evidence for their claims. People are not always reliable witnesses and the often compound effects unconsciously. For example, a person taking herbal supplements and antibiotics might attribute the herbs with killing off the infection instead of the conventional medicine.

Examples

Alien abductions.
Ghosts.
Alternative medicine.

Scientific language does not make science

Science is such a powerful force in our society that people will try to sound scientific to gain respectability and people who do not have the proper evidence for their theory will often try to disguise that fact by using scientific sounding language.

Examples

Crystal power believers frequently talk of “higher energies” and “resonant vibrations.”
Alternative medicine often uses jargon from physics, chemistry, and conventional medicine.

Bold statements do not equal truth

Claims of the extreme importance of a discovery that are not backed up with evidence often mean that it is pseudoscience. Good science waits until the results have stood the test of time before commenting on a discoveries' importance. Statements about the importance of a discovery should be made after the validity is no longer in doubt and by other people.

Examples

Dianetics founder L. Ron Hubbard said “the discovery of Dianetics is a milestone for man comparable with his discovery of the wheel and the arch.”
The cold fusion fiasco of the late '80s shows that scientists can fall prey to this fallacy too.

Heresy does not equal correctness

When criticized pseudoscientists often respond by comparing themselves to Copernicus or Galileo. Their theories were initially very controversial but eventually gained acceptance. But just because an idea is controversial does not mean that it is correct. For every controversial idea that becomes accepted, there are thousands that never make it.

Burden of Proof

People will often try to shift the burden of proof to the supporters of the established theory. It is not the scientists' job to prove the new idea is incorrect. It is the job of the person making the extraordinary claim to prove that they are correct.

Examples

When creationists debate evolutionists they often do not present any positive evidence for their case. Instead they challenge the scientist to prove them wrong.

Rumors do not equal reality

Urban legends are even worse evidence than personal testimony when trying to prove a point. Often these arguments take the form of "I showed this to a scientist at a top research university and he agreed with me." Everyone has heard the stories about travelers waking up sans kidney but there are no documented cases of this ever happening.

Examples

The Roswell incident
Microwaved poodles
Organ theft.

The unexplained is not inexplicable

Non-scientists often believe that if they cannot explain something then it cannot be explained by anyone. This is obvious bad logic.

Examples

Firewalking is made possible by the thermal properties of wood ashes and not by mystical powers.
They pyramids were built by dedicated and skilled artisans not by aliens.

Failures are rationalized

In science, failures often tell us more than successful experiments. We try to accept them and learn from them. In pseudoscience, failures are often explained away as a special circumstance and are ignored.

Examples

When a psychic fails to demonstrate their powers, they often claim it is because of negative energy or the intermittent nature of their powers.

After-the-fact reasoning

Also called "*post hoc, ergo propter hoc*". It means "after this, therefore because of this." Comes from a false belief that a correlation between two events means the first causes the second. Just because two events happen in sequence there is no guarantee that the first event caused the second.

Examples

There are many examples from the world of sports. A player who has made

his last 10 shots is not guaranteed to make his next.
Some studies indicate that a higher percentage of college graduates report being homosexual. Therefore, college makes you gay.

The power of coincidences

Most people are unfamiliar with the laws of probability and underestimate the likelihood of two events happening in sequence. We also tend to remember unlikely events occurring but forget all the times they did not occur. Psychologists call this intermittent reinforcement.

Examples

How many people do you have to put together before there's a 50/50 chance of two of them having the same birthday? Answer: 23
Pres. Eisenhower once expressed alarm over the fact that half of all Americans have a below average IQ.
Gamblers forget all the times they've lost and selectively remember their wins.

Emotive words and false analogies

Rather than letting their case rest on its evidence, people will often try to appeal to the public's emotions for support. Emotional analogies and metaphors are not real evidence in the same way that testimony and rumors are not.

Examples

Environmentalists are fond of the phrase "raping the earth."
Cancer metaphors are also popular.

Appeal to ignorance

"If you cannot prove me wrong, then I must be right." In science belief should come from positive evidence in support of the theory not from a lack of negative evidence. Closely related to the burden of proof fallacy.

Examples

Psychics like to say that if we cannot prove that they don't have powers then they must actually have them.
Alternative medical treatments often use this argument.

Ad Hominem attacks

Means "to the man." Pseudoscientists often attack the personal characteristics of the scientists that developed the competing theory. Because a person has unpopular traits it does not mean that the evidence they discovered or the theory they developed is incorrect.

Examples

Creationists almost automatically call anyone supporting evolution an atheist regardless of their beliefs.
Einstein was a bad husband and father but that in no way reflects on the

validity of his work.

Argument from authority

Pseudoscientists often make arguments that basically say you should believe me because I have these academic credentials. Our reliance on authorities sometimes makes us accept bad ideas because they come from an authority or reject good ideas because they don't. It's not the credentials of the researcher that matter, it's the quality of their evidence.

Examples

Einstein rejected parts of the quantum theory of matter despite its obvious success at describing the way atoms work.

The theory of plate tectonics was rejected for 50 years because the man who suggested it was a meteorologist and not a geologist.

Many pseudoscientists will emphasize that they have advanced degrees – sometimes they're bogus.

Either-or fallacy

Also called a false dilemma. This is an attempt to force you to choose one position or the other by excluding the intermediate choices. Then if they discredit the other choice, you will be forced to adopt theirs.

Examples

"If you're not for me, you're against me."

"You're either part of the problem or part of the solution."

Either life was divinely created or it evolved.

Circular reasoning

Also called "begging the question" or a tautology. Occurs when your conclusion is just a restatement of one of your assumptions.

Examples

Capital punishment supporters often argue that we must have the death penalty to deter people from committing violent crimes which is their basic assumption but just restated.

Literal creationism starts from the assumption that evolution does not occur and then retrofits facts to match that assumption to "prove" that evolution is false.

***Reductio ad absurdum* & Slippery slope**

RAA: Carry through an argument to its logical end making it seem absurd. If the conclusion is absurd, the theory must be too. SS: Construct a chain of events where one thing leads inevitably to an ending so extreme that you should never take the first step.

Examples

You often hear arguments of this nature from people opposed to the legalization of drugs.

Both sides of the abortion debate often resort to the slippery slope fallacy.

References

- ▶ M Shermer, *Why People Believe Weird Things*, (Freeman, New York), 1997, pp. 44-61.
- ▶ C Sagan, *The Demon Haunted World*, (Ballantine, New York), 1996, pp. 203-218.
- ▶ M Gardner, *Fads and Fallacies in the Name of Science*, (Dover, New York), 1957.