Fallacies and Biases

how NOT to think logically



George Matthews, Plymouth State University
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How logical are we really?



We may all be *capable* of listening to reason but...

- We get fooled by fallacies.
 - Fallacies are bad arguments that can look good if we are not paying attention.
- Our thinking gets short-circuited by cognitive biases.
 - Cognitive biases are "bugs" in our mental operating systems that convince us that we know what just isn't so.

Types of fallacies

Fallacies of relevance

• Rely on irrelevant information to push the argument along.

Fallacies of ambiguity

• Depend on multiple meanings of key terms to fool us.

Fallacies of presumption

 $\circ~$ Rely on hidden assumptions to establish their conclusions.

NOTE: fallacies are typically invalid arguments that rely on tricks to close the gap between premises and conclusions.

Types of cognitive biases

Hot biases

 Motivated irrationality: ways in which our thinking goes off the rails when its results would conflict with what we want.

Cold biases

 Unmotivated irrationality: mistakes in reasoning that are by-products of the way our minds are built.

NOTE: cognitive biases are the result of the complexity of our mental "software" and the fact that our reasoning minds are not entirely separate from our emotional and perceptual minds.

fallacies of relevance

fallacies of ambiguity

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hot biases

Appeal to authority

Stephanie is a scientist and she says that vaccines cause autism.

Thus vaccines are not as safe as the doctors are telling us.

While we often have no choice but to rely on experts, simply appealing to their expertise is never a good idea. Instead we should see what their claims are really based on, otherwise we still have no real reason to believe what they tell us.

fallacies of relevance

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hot biases

cold biases

Ad hominem

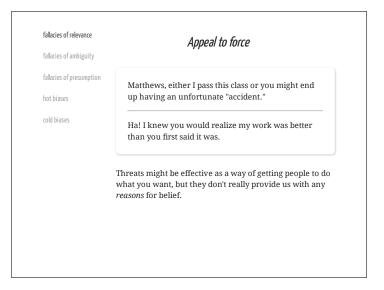
My trainer has me on a strict diet and says that my health will be better if I lose some weight.

But I saw him binge eating ice cream the other day, so I guess his advice is worthless.

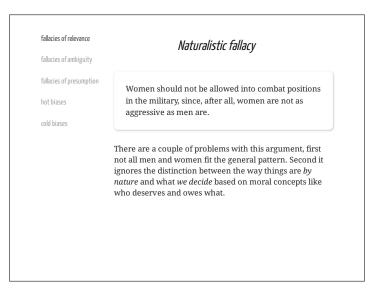
Even if we might attack someone for not "praticing what they preach," that is really irrelevant in that the same argument might have been uttered by someone else.

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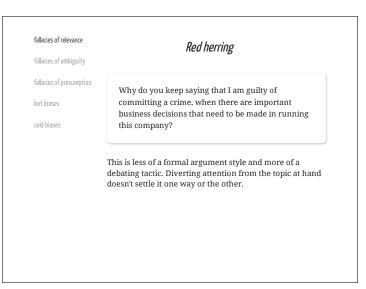
fallacies of relevance fallacies of presumption hot biases cold biases The majority of course might be wrong, no matter how numerous they are. This is why democratic societies are not only based on the principle that the majority gets to decide but instead we all have rights that protect us from the majority.



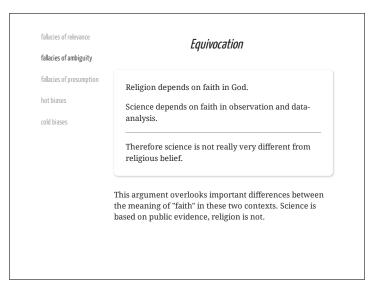
fallacies of relevance fallacies of ambiguity fallacies of presumption hot biases cold biases If evolution is correct then we are all related to all other organisms on the planet. I refuse to admit that I am related to cockroaches in any way. Therefore evolution must be wrong. While we may not like the consequences of a theory, if the evidence really supports it, we'll just have to get used to them.



This study was funded by a large pharmaceutical
company, so we can dismiss it as propaganda intended only to serve the interests of the
corporation's stockholders.
This fallacy is a generalization of the last one — it appeals the origins of something to determine the basic nature of that thing. Like other fallacies of relevance this argument mistakes the messenger for the message — isn't what is saidecisive, not who says it?



fallacies of relevance fallacies of presumption hot biases I oppose taxation because it involves taking money from me unwillingly and that is the same thing as theft! Analogies can help us illuminate obscure or abstract concepts, but they can also mislead us since they only go so far. We may wonder in this case about any relevant differences between taxation and theft.



fallacies of relevance

fallacies of presumption
hot biases

cold biases

My opponent in this debate has stated that she doesn't believe in the Biblical creation story.

But that amounts to saying that there is no meaning at all in life, which is ridiculous.

This is a debating trick that fails to address the topic at hand in the interest of scoring points with the audience.

fallacies of relevance
fallacies of ambiguity

fallacies of presumption
hot biases

Cold biases

There are studies that show that vaccines are linked with autism.

So parents should have the right to opt out of childhood vaccination.

There is likely to be "evidence" for just about anything that we want if we look hard enough and ignore any evidence to the contrary. But the question is what the evidence as a whole shows. Even a broken clock is right twice a day.

fallacies of relevance

fallacies of presumption

There is no evidence linking asbestos to cancer.

hot biases

This is not even really an argument, but a simple statement offered without evidence. It may seem like just stating something without argument would fail to convince anyone, and yet there is nothing like repeating a simple statement enough to get it stuck in people's heads.

fallacies of relevance

fallacies of ambiguity

fallacies of presumption

I know that ghosts exist because I have seen them with my own eyes.

cold biases

While many people trust eyewitness testimony, the question here is how someone might know that what they saw was really a ghost. This would require accepting the assumption that ghosts do exist, but isn't that what the argument is claiming to prove?

fallacies of relevance

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Cold biases

There is no proof that the CIA did not assassinate

Kennedy and then cover it up.

That's why I think that they did.

Conspiracy theories often rely on appeals to ignorance like this. They shift the "burden of proof" to someone opposing their viewpoint as opposed to providing sufficient evidence to prove their claims to be correct.

fallacies of relevance

fallacies of presumption
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Cold biases

This is a quote from Richard Nixon, who in the last days of his presidency, believed that everyone who was not completely on his side was completely against him. There are, of course other options. Also known as the "black or white fallacy."

fallacies of relevance

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Three Democrats I spoke with are opposed to abortion.

Thus all Democrats are opposed to abortion.

This is clearly too small a sample size to provide evidence for a claim about millions of people. Reliance on "anecdotal evidence" is another variety of this fallacy in that anecdotes report individual cases that may or may not show a general pattern.

fallacies of relevance

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hot biases

If we allow human cloning, we'll end up with a dystopian future like in the movie "The Island" where clones are made just for "spare parts" and have no rights of their own.

Alarmist claims about what will happen are hard to avoid since we do tend to think of worst case scenarios. In this case, since a clone is nothing but an artificially produced twin, raising a clone for its parts would be illegal and immoral.

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When the coach yells at us for losing badly, we play better the next game.

When he praises us after a great win, we don't do so well the next game.

SO negative reinforcement works, and positive reinforcement doesn't.

Isn't a better explanation here that after playing either better or worse than average, the team returns to their average?

fallacies of relevance

Circular reasoning

fallacies of ambiguity

fallacies of presumption
hot biases

Cold biases

You must be mentally ill if you commit a mass murder.

This is because only mentally ill people would do such a thing.

Which explains which according to this argument: does mental illness explain mass-murder or does mass murder prove mental illness? In either case no evidence is here presented.

fallacies of relevance
fallacies of presumption
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cold biases

The problem here lies in not taking into account all of the available evidence. Good explanations of the data are not found by looking only at evidence that appears to confirm one's hypothesis.

fallacies of relevance
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We often forget that we are fundamentally social beings heavily invested in what (we think) others think of us. One rotten apple can spoil the whole barrel.

fallacies of relevance
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we really can have endless economic growth and protect the enivornment at the same time!

The old saying that if it sounds too good to be true, it probably is applies here.

fallacies of relevance

Anchoring effects

fallacies of presumption
hot biases

This T-shirt is only 100 dollars! That is such a bargain compared to the one selling for 1000 dollars you showed me first!

Even if nobody would pay such an outrageous price for a T-shirt just asking for such a price at the beginning of negotiations raises what we might later come to accept as a fair price. This reflects a bias towards information that comes first, regardless of its independent believability.

fallacies of relevance

The fundamental attribution error

fallacies of ambiguity

fallacies of presumption
hot biases

If I happen to be rude to someone at the store, it is because I am stressed out by work pressure, but if you are it is because you are a jerk.

When we account for our own behavior we have a (realistic) sense of the large influence of external influences, but when we asses other people's behavior we tend to overemphasize their "internal" causes, how bad decisions reflect their true feelings and intentions.

fallacies of relevance

The availability heuristic

I just heard the news about a terrorist hijacking a plane, so rather than fly to Florida I will drive.

A heuristic is a "rule of thumb" that might work in some contexts but fails in others. In this case even if a terroristic attack sticks out in one's mind, since it is dramatic, it is far more likely that you will get hurt or killed in a car wreck. What is available to the mind is not always the same as what is really more likely.

Find out more

Your Logical Fallacy Is: A well designed website with good examples of a variety of fallacies.

Your Bias Is: By the creators of Your Logical Fallacy Is, this site is devoted to some important cognitive biases.

Logically Fallacious: a comprehensive list of hundereds of types of fallacies and biases.

Fallacies: The Internet Encyclopedia page on logical fallacies has another comprehensive list.

