Chapter 3: Introduction to Fallacies[1]

A Little More Logical | Brendan Shea, Ph.D. (Brendan.Shea@rctc.edu)

1 CONTENTS

2 WHAT ARE FALLACIES, AND WHY ARE THEY BAD?

In this chapter, we'll be changing gears a bit. By now, you should already be familiar with the basics of arguments. In particular, you'll remember that (1) arguments always have a claimed *inferential link* between the premises and conclusions, (2) depending on how strong this inferential link is, we can classify the argument as *deductive* or *inductive,* and finally, (3) to evaluate the success of a given argument you need to consider BOTH the structure/form of the argument AND the truth of the premises. In the end, there are two ways of making a good argument: you can make a sound deductive argument (valid with true premises) or a cogent inductive argument (strong with false premises). By contrast, arguments could go wrong in all sorts of ways: deductive arguments might be invalid, inductive arguments might be weak, or the premises of any argument might be false.

[1] Unless explicitly noted otherwise, all the art in this chapter is from Ali Almossawi's excellent *Book of Bad Arguments,* which is free for non-commercial use. See the book here: https://bookofbadarguments.com/.

With this background, we can now start talking about how to recognize some of the most common sorts of bad arguments, which we'll *fallacies*. Some questions we'll be looking at in this lesson include the following:

1. What is a **fallacy**? What is the relationship between fallacious reasoning and the concepts of validity, soundness, strength, and cogency?
2. What is a **formal fallacy**? When do formal fallacies commonly occur?
3. What is an **informal fallacy**? How can you tell whether an informal fallacy has occurred?
4. Can you explain the differences between fallacies of **presumption, ambiguity,** and **grammatical analogy** (or **mereology)**? What are some examples of each type of fallacy?

A **fallacy** is a flawed argument or way of reasoning. They can be valid or invalid, or strong or weak. The only thing they can never be are sound or cogent. Fallacies can be written, spoken, or merely "thought." When studying fallacies, it's important to remember that everyone (including you! And me!) commit fallacies. Many of us have a (fallacious) tendency to only notice fallacies when they come from the mouths of people we dislike. The **principle of charity** requires we always attempt to represent other peoples' arguments, so they do not contain fallacious reasoning. So, accusing someone of committing a fallacy should be a last resort, not an opening move. Psychological research has consistently shown that people are much better at detecting other people's fallacies than they are at detecting those they have committed. So be careful!

[Question: Can you give an example of a time you've committed a fallacy?]

2.1 FORMAL VS. INFORMAL FALLACIES

A **formal fallacy** is an instance of an argument that is DEDUCTIVE BUT INVALID**,** and it can be detected merely by considering the argument's logical form. I've included a few famous examples here (which college students back in the Middle Ages would have had to memorize!). These are important primarily because they look pretty similar to certain valid argument forms, which can lead to confusion.

Example 1: Fallacy of **denying the antecedent.** If X then Y. Not X. Therefore, not Y.

- "If Liz is a spy, then she sometimes tell lies. Liz is not a spy. Therefore, Liz never lies." (Why is this a fallacy? Because the mere fact that Liz isn't a spy doesn't mean she doesn't lie!).
- This fallacy is called "denying the antecedent" because one of the premises involves asserting that the antecedent of a conditional (in the other premise) is false. The conclusion then says that the consequent of this conditional is false.

Example 2: Fallacy of **affirming the consequent.** If X then Y. Y. Therefore, X.

- "If Larry is a spy, he likes to ask people strange questions. Since Larry likes to ask people strange questions, we can conclude that Larry is a spy."
- If you haven't guessed, the fallacy here involves saying that since the consequent of a conditional is true, its antecedent must also be true.

Example 3: Fallacy of **illicit major (or minor).** All Ys are Xs. No Ys are Zs. So, no Xs are Zs.

- "All assassins are humans. No assassins are philosophy professors. So, no humans are philosophy professors."
- While you don't need to worry too much about the name of the fallacy, the basic idea here is that the conclusion contains two terms: "philosophy professors" and "humans." This fallacy occurs because the conclusion asserts a claim about *every single human* (none of them are philosophy professors!) without also having a premise that makes a claim about every human. In a categorical syllogism, this sort of thing doesn't work.

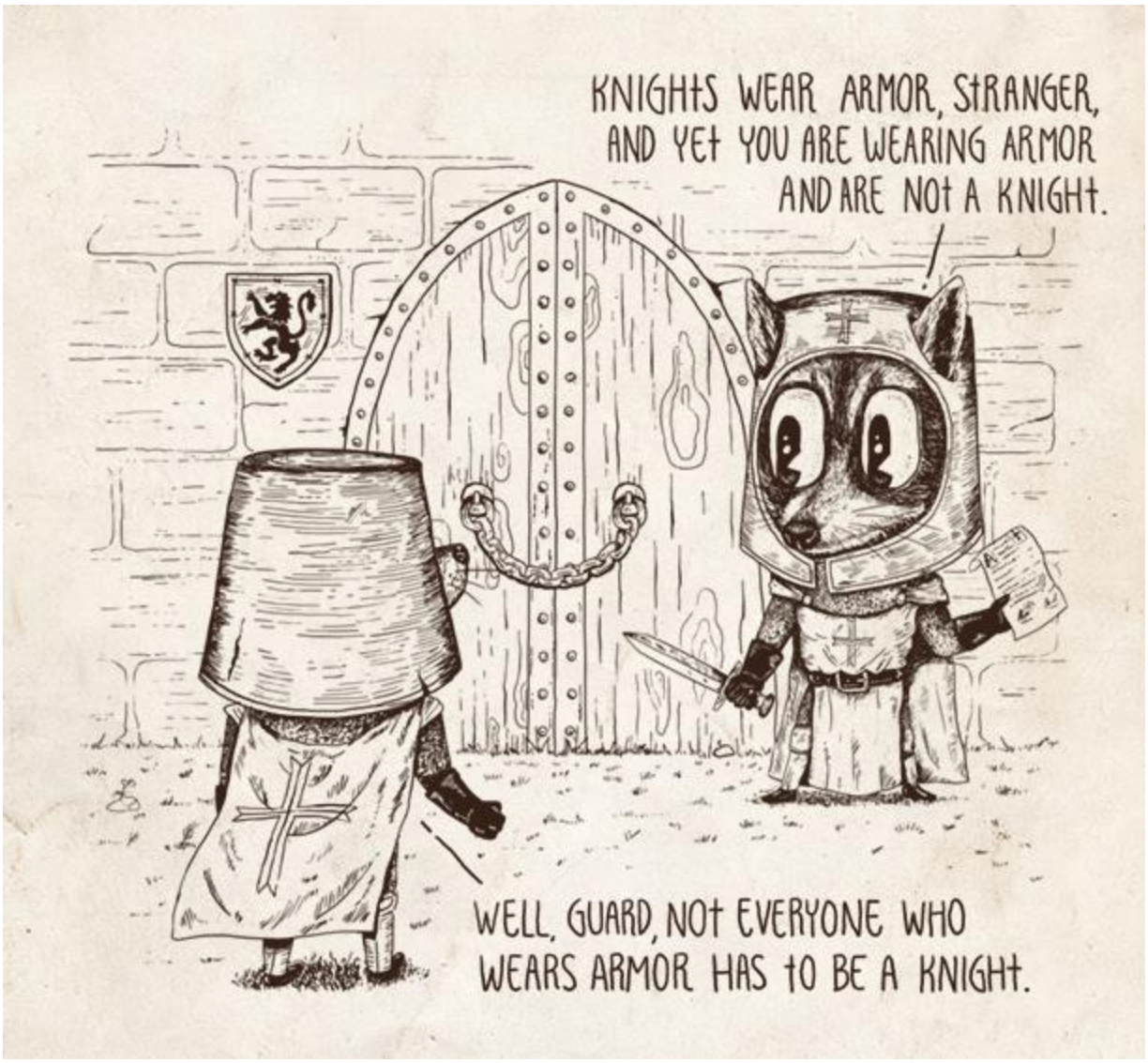


Figure 1 Affirming the Consequent. From "The Book of Bad Argument."

There are many more formal fallacies than just these three. In fact, if we define all invalid deductive arguments as formal fallacies, there will be an *infinite* number of formal fallacies (though there will also be an endless number of valid deductive arguments…). You can learn to identify these fallacies by studying varieties of formal deductive logic (such as categorical or propositional logic).

[Question: Give an example of a formal fallacy of the form "affirming the consequent" or "illicit major".]

An **informal fallacy,** in contrast to a formal fallacy, is a defective argument that can only be detected by examining the argument's content. Informal fallacies can be deductive or inductive, and either strong/weak or valid/invalid. (The only thing they can't be is cogent or sound). For example, any inductive argument that **suppresses evidence** commits an informal fallacy. For example,

- "The Earth does not appear to be round to people who are walking on it. [No scientific evidence concerning the shape of the Earth is mentioned.] So, the Earth is probably not round."

- While this is a bad argument, we can't tell that it is bad *merely by looking at the form of the argument.* The only reason that we know it is bad is that we have some background knowledge on the topic of this argument (e.g., regarding the shape of the Earth). This contrasts with formal fallacies, which can be identified without knowing what the argument is "about."

2.2 A WARNING: CONDITIONAL STATEMENTS CAN BE STRANGE

Many formal fallacies involve conditional statements. It's important to remember that, in formal deductive logic, a conditional is false only when the antecedent is TRUE and the consequent is FALSE. On the other hand, all conditionals with false antecedents are true, as are all of those with true consequents. Some weird examples of conditional statements:

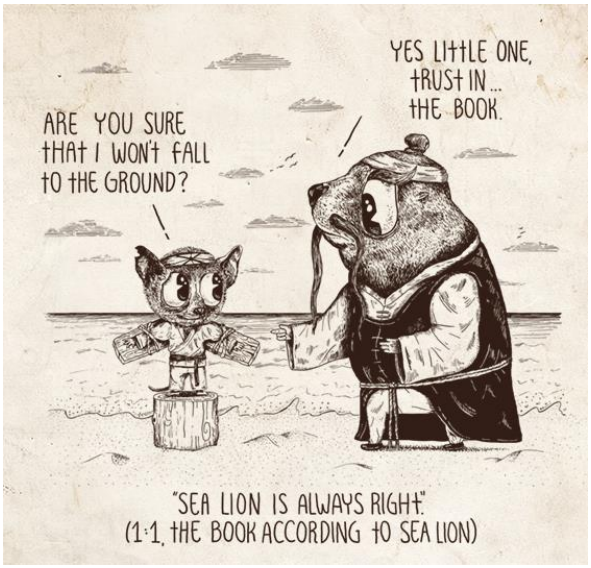
- If Batman lives next door to Donald Trump, Donald Trump is at least seven feet tall. (Since there is a false antecedent, the conditional statement as a whole is true. So would "If Barack Obama lives next door to Batman, the moon is made of green cheese.")
- If the sun exploded this morning, the average Earth temperature is below 200 degrees. (Since there is a true consequent, the whole thing is true).

[Question: Give an example of conditional statements (the weirder, the better!) with (1) a true antecedent and true consequent, (2) a false antecedent and false consequent, (3) a true antecedent and false consequent, and (4) a false antecedent and true consequent. Only ONE of these is false—which one is it?]

2.3 FALLACIES OF PRESUMPTION

Fallacies of presumption are informal fallacies involving premises that would likely be unacceptable to anyone initially suspicious of the conclusion. These fallacies "presume" the truth of the conclusion, instead of providing independent evidence for it. These arguments can be either deductive or inductive, and are often strong or valid. The problem in these arguments concerns the acceptability of the *premises* (so, they are uncogent or unsound).

Begging the question (circular argument): A, B, and C [C is often implicit]. Therefore, C.



This fallacy occurs when one or more of the premises (it might be an implicit one) is too "close" to the conclusion. Making an argument of this sort should cause someone initially suspicious of the conclusion to ask the question, "And why should I accept that premise?" (Hence, the name "beg the question."). It's important to note that what counts as "begging the question" might depend on who you are arguing with. So, for example, it might be legitimate to include a premise appealing to the truth of a certain religious text if you are talking to someone who shares your general religious beliefs. However, it would NOT be OK to do this when arguing with someone who didn't share this background with you.

- Example "Since abortion violates a fetus's right to life, it is morally wrong. [Implicit premise: Fetuses have a right to life.]"
- Example: "Everyone knows that women have a right to their own bodies, just like men. So, women have a right to get an abortion. [Implicit premise: A woman's right to her body means she has a right to get an abortion]

Both of these examples are deductive, valid arguments! The only problem is that one of the premises is a non-starter, at least if you are trying to talk to someone who isn't convinced about the truth of your conclusion. (For similar reasons, this would be a bad way of reasoning for someone who was trying to figure what his/her position on abortion should be in the first place.)

In many cases, "Begging the Question" involves thinking about what sorts of premises *other* people are likely to accept. For example "You obviously want to make America great again, so you must love Donald Trump" or "You seem to care about women's success, you must have voted for Clinton" are both question-begging arguments, since the premises they assume (implicitly) are NOT the sort of premises you can count on others to accept.

[Question: Choose a topic you know something about, and give an example of a "begging the question" fallacy about that topic. Put it in standard form!]

False dichotomy: A or B [leaves out plausible options C, D, E, etc.]. Not B. So, A.

This fallacy occurs when there is an "either-or" premise that leaves out some viable option. While this can occur in a variety of contexts, it often happens because we are simply *convinced* that our view is the right one, and that the only alternatives are obviously crazy or false ones. So, for example, in politics: "You can either vote for Democrats or you can vote for the woman-hating rich guys" or "You can either vote for the Republicans or you can vote for the party that hates freedom and God." As with begging the question, the premise in question often "feels" true to the person that is making the argument. However, this doesn't make it a good premise in an argument intended to convince *other* people. (And again, we should also try to avoid reasoning this way when we are trying to make up our minds initially.)

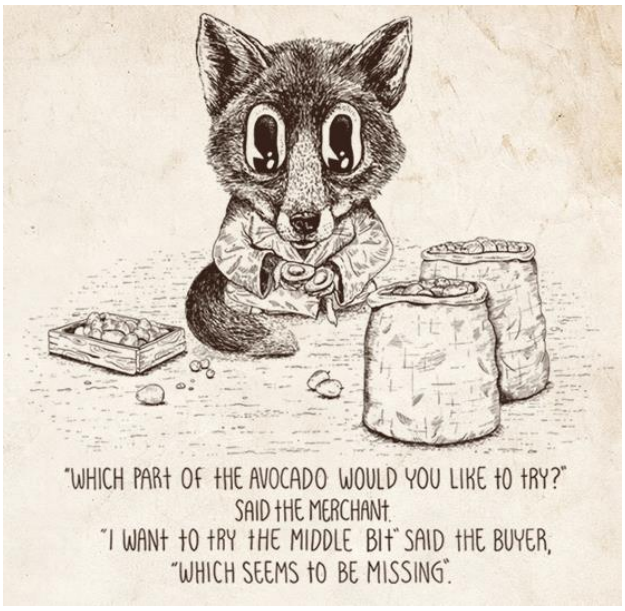


Figure 2 False dichotomy. From "The Book of Bad Arguments."

- Example: "Either Karl Marx was entirely right about economics or Adam Smith was. Since Adam Smith was not entirely right, Karl Marx was right." (alternate version: "Since Marx isn't entirely right, Smith must be)
- Again, the two versions of this argument are both deductive and valid (it's a type of *disjunctive syllogism*). However, the premise saying that either Marx was entirely right or that Smith was obviously leaves out a number of options (among others, it leaves out the possibilities that they both were partially right, or that they both were entirely wrong, etc.)

[Question: Choose a topic you know something about, and give an example of a "false dichotomy" fallacy about that topic in standard form.]

The fallacy of **complex question** often occurs when someone is (perhaps unconsciously) trying to set up a fallacious argument. It is closely related to begging the question. The fallacy involves asking a question that (illicitly) presumes some condition is true. After the person answers, the arguer than constructs an argument for that very presumption.

- A: "So what did you after you ate all of my Taco John's leftovers?"
- B: "Nothing"
- A: "You say that you did nothing after eating my leftovers. But this implies that you *did* eat them. I knew you were a thief!"

In this case, the fair thing for A to do would be to ask TWO questions: "Did you eat my leftovers?" and "What did you afterward?" As you might have noticed, this "fallacy" isn't actually an explicit argument. However, it counts as a fallacy because the questioner clearly has an argument (and more specifically, a particular conclusion to an argument) in mind when they ask this sort of question.

A General Note on Fallacies of Presumption. In real life, the fallacies listed above almost never work to "win" arguments—instead, they frequently lead to a breakdown in communication, as the person you are trying to argue with either gets angry (because they think you are misrepresenting their view) or ignoring you. The problem with these fallacies is that we often don't realize we've made them until after the fact—after all, the premises seemed to true to us! To avoid these fallacies requires thinking hard (*before* making an argument) about where the other person is coming from, and which sorts of premises he/she might be open to accepting.

2.4 FALLACIES OF AMBIGUITY AND ILLICIT TRANSFERENCE

Fallacies of ambiguity are informal fallacies that occur when a key term means something different in the conclusion from what it does in the premise. These arguments are often deductive (since they rely on *definitions*), but they are either invalid OR have a false premise (so, they are unsound either way). Some examples include:

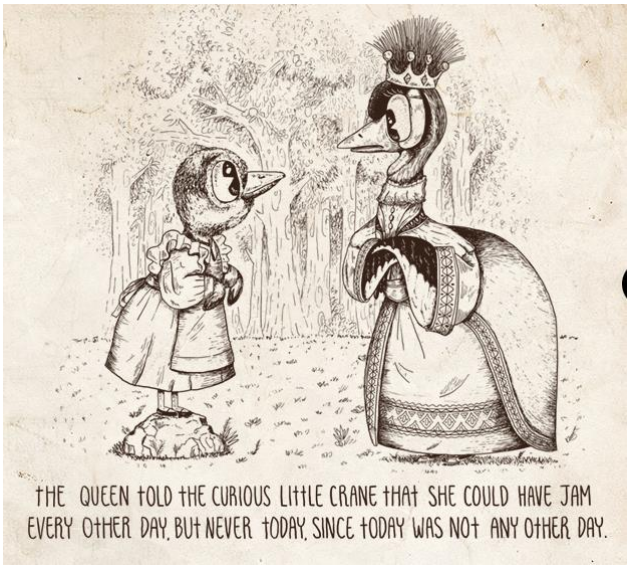


Figure 3 Equivocation. From "The Book of Bad Arguments"

Fallacy of equivocation: "A" (where "A" does not mean X). Therefore, C (where C depends on "A" meaning X).

- "I have a right to a divorce. Therefore, I have every right to divorce my spouse to marry someone hotter and richer. [Premise describes legal right; conclusion depends on moral right]."
- This equivocates on the word "right."

Amphiboly: Person P claimed "A" (where A does not mean X). So, P is committed to X.

- "Natalie has repeatedly said that she supports animal rights. So, Natalie must be in favor of allowing earthworms to vote."
- This misinterprets what Natalie meant when she said she was in favor of "animal rights."

These fallacies can sometimes be difficult to tell apart. As a rule of thumb, the fallacy of equivocation occurs when a person uses the same word (at least) twice during an argument, but it changes meaning over the

course of the argument. By contrast, amphiboly occurs when the argument rests on a misinterpretation of what *someone else* said.

[Question: Give an example of a fallacy of equivocation or amphibology. Hint: to get started, try to think of a word that has multiple meanings. Now, use ONE of these meanings in the premise of the argument and the other meaning in the conclusion.]

Mereological fallacies (sometimes called **fallacies of illicit transference**) involve illicit inferences concerning parts and wholes.

Fallacy of composition: Each part of W has property P. So, W has property P.

- "Every U.S. citizen has a unique DNA sequence. So, the U.S. as a whole has a unique DNA sequence."
- "An individual can save money by spending less. Therefore, the economy as a whole would have much more money if everyone stopped spending so much." (in economics, this is called the *paradox of thrift,* and it says that if everyone starts saving their money, the economy as a whole will actually shrink, and not increase.)
- "Link can't defeat Ganon with just a sword. He also can't defeat Ganon with just a shield. So, Link can't defeat Ganon with both a sword and a shield." (The problem: it could be that the combination really does allow Link to defeat Gannon).

Fallacy of division: W has property P. So, each part of W has property P.

- "The U.S. government has the right to punish criminals. So, each individual U.S. citizen has the right to punish criminals."
- "A bird can fly. Therefore, each individual body part of the bird can also fly (if detached from the bird)."
- "Water is healthy to drink, and it is made partially of hydrogen. So, hydrogen is healthy to drink."

Mereological fallacies are sometimes called **"fallacies of grammatical analogy"** since there are perfectly good arguments that look exactly like these fallacies. For example, suppose we know that the population of Minnesota is 6 million, and the population of Wisconsin is 5 million. We can conclude that the combined population of both states is 11 million without any problem. (This is because population is the sort of property that allows us to go from parts to wholes. This isn't true of every property, however).

2.5 SOLVED PROBLEMS: FORMAL AND INFORMAL FALLACIES

Determine which fallacy is committed by the following passages, if any.

Passage	Analysis
All Capulets are enemies of the Montagues. Some enemies of the Montagues are pirates. So, some Capulets are pirates.	This is a formal fallacy (the **fallacy of undistributed middle)**. It is a deductive argument, but isn't valid, since the conclusion doesn't *necessarily* follow from the premises.
Juliet, you obviously should not marry Romeo, because both your father and I disagree. I'm sure you'll agree that parents always know better than children about things like this.	While this argument would need to be spelled out a little, it looks like it is an instance of begging the question (an informal fallacy). After all, why should Juliet accept the premise about parents always being right?

If someone insults your honor, there only two choices: challenge them to a duel, or live forever in shame. Since Mercutio insulted your honor, you don't want to live forever in shame, you should definitely challenge him to a duel.	This is a false dichotomy, since it assumes there are only two options—duel or live forever in shame. (In real life false dilemmas, the person making the argument often "feels" these are the only two choices, even though the evidence doesn't support this).
Romeo's friends would be happy if he married Rosaline. His friends would also be happy if he married Juliet. So, his friends would be even happier if he married BOTH Rosaline and Juliet.	This commits the fallacy of composition (obviously, the friends would not suddenly become twice as happy if Romeo secretly had two marriages, and two wives).
If Juliet got an A in logic class, then Shakespeare wrote *Romeo and Juliet.*	This is a conditional statement, and not an argument at all! It is also guaranteed to be a TRUE conditional statement, since we know that the consequent is true (since Shakespeare really did write R and J). This means the whole statment would be true REGARDLESS of what the antecedent was ("If Juliet got a D…", "If she never took logic class..,").
All Venetians are Italians. All Italians are Europeans. So, all Venetians are Europeans.	This is NOT a fallacy.
It is impossible for Juliet to confess her love to Romeo using any single word. So, it is impossible for Juliet to confess her love to Romeo using any combination of words.	This is an informal fallacy concerning wholes (sentences, paragraphs) and their parts (words). It looks like a fallacy of composition, since the premises concern parts and the conclusions concerns the whole.
Since you don't like Shakespeare, you clearly have bad taste in literature.	This begs the question, since the implicit premise ("Everyone with a good taste in literature likes Shakespeare") would be unacceptable to anyone to whom this argument was addressed.
Romeo just compared Juliet to the sun. He obviously thinks she is made of very hot gas, just like the real sun.	OK, so this is a bit ridiculous, but it is an example of amphiboly (an informal fallacy). More seriously, though, amphiboly often happens when someone tries to make an analogy, and people respond by misinterpreting this analogy in uncharitable ways.
If Juliet marries Romeo, she doesn't marry Paris. Juliet doesn't marry Paris, so she must marry Romeo.	Even though the conclusion here is true (Juliet does marry Romeo in the play), this commits a formal fallacy, since it uses an invalid form of deductive reasoning (affirming the consequent).
Why do English teachers like to torture their students by making them read Shakespeare?	This is an example of a complex questions, since it assumes that English teachers do, in fact, like to torture their students.

2.6 REVIEW PROBLEMS

1. In your own words, explain the following concepts, and give examples of each

a. Fallacy
b. Formal fallacy
c. Informal fallacy
d. Fallacy of presumption
e. Mereological fallacies

2. How common is fallacious reasoning? Can you give some examples of fallacious reasoning (of the type described above) that you've seen others commit?
3. Which fallacies discussed above do you think that YOU are most prone to commit? Why do you think this is?
4. Why do you think that we (as humans) are so prone to fallacious reasoning? What could we do to improve on this?

3 FALLACIES OF RELEVANCE

Fallacies of relevance are informal fallacies that occur when the premises of an argument are *logically irrelevant* to the conclusion. These fallacies often occur when we do the following things:

1. Ignore logically relevant evidence because (a) it disagrees with conclusions to which we are emotionally committed or (b) we have negative feelings about the evidence source.
2. Give too much weight to logically irrelevant evidence because (a) it agrees with conclusions to which we are emotionally committed or (b) we have positive feelings about the evidence source.

People rarely admit (even to themselves) when they are committing a fallacy of relevance, since many of these arguments are obviously bad ways of reasoning. However, this does not mean these fallacies are impossible to detect or avoid—it's simply a matter of asking yourself why you really believe something, and then considering whether this is actually a good reason. As is the case with all fallacies, the fact that someone has a committed a fallacy of relevance does not necessarily mean that his or her beliefs are false (though it does mean he or she doesn't have any good reason to think their beliefs are true.).

In this section, you'll learn to identify some of the most prevalent of these fallacies, including the appeal to force, appeal to pity, appeal to the people, ad hominem, straw man, and red herring.

3.1 APPEAL TO FORCE AND APPEAL TO PITY

The **appeal to force** involves a premise threatening physical, psychological, or economic harm if a certain conclusion is not accepted. The general form is as follows:

- Premise: You (or someone else) will be harmed if you don't believe C.
- Conclusion: So, C.really is true.

Some examples are as follows:

- "If I don't agree with my cousin about the awesomeness of WWF wrestling, he will put me in a headlock. So, WWF wrestling is awesome."
- "I will get into a lot of trouble (with the police, or the mean kids at school, or my family, etc.) if anyone hears that I doubt the truth of C. So, C really must be true."

Depending on the way in which they are expressed, appeals to force are often invalid deductive or weak inductive arguments (as is the case with the ones above). However, one could make them deductively valid or inductively strong by including a premise such "If am afraid of not believing C, then C really is true." The problem now is that this premise is obviously false and so, the argument ends up failing for a different reason. The fact that this is a fallacy means that it can NEVER be sound (if deductive) or cogent (if inductive).This same thing will be true of many of the fallacies we will study—while they are clearly *bad*

arguments, the precise nature of their badness will often depend on whether or not certain implicit claims are made explicity.

The **appeal to pity** involves a premise detailing the suffering that will be experienced (usually by an innocent person or group) if a certain conclusion is not accepted as true. The general form is as follows:

- Premise: Believing C will help a person or group worthy of my pity.
- Conclusion: C really is true.

Some examples are as follows:

- "It would break my grandmother's heart if I stopped believing in God. So, God exists."
- "My cousin has had a rough life. So, I'm just going to assume that he's telling the truth when he says he had nothing to do with the crime with which he has been charged, and that all the witnesses are lying."

In real life, appeals to force and pity are rarely formulated as "arguments." Instead, they show up as people change their beliefs to reflect their changing social environments. So, for example, many political and religious ideologies were originally spread by use of the appeal to force ("covert or die"), appeal to pity ("I don't want to upset my parents and friends by disagreeing."), and to things like appeal to the people (see below). This historical fact is *irrelevant* to the truth or falsity of the claims of these various ideologies. However, it does mean that these people did not convert for good *reasons* (i.e., the truth of the religion may have had little to with their original conversion).

[Question: Choose a topic you know something about, and give an example of an appeal to force or appeal to pity related to that topic. Put it in standard form (of course!).]

3.2 APPEAL TO THE PEOPLE

The **appeal to the people** involves a premise (often implicit) stating that belief in the conclusion is necessary to gain or maintain membership in some group.

- Direct version: You will be valued and accepted if you believe C. Therefore, C.
    - "All of my friends think that the Green Bay Packers are the most skilled football team in the NFL. I know that they will like me better if I believe this too. So, the Packers really are the most skilled football team in the NFL."
- **Bandwagon:** The majority of people [who have no special expertise on C] believe that C. Therefore, C.
    - "In 1800, most people believed slavery was OK. So, slavery really was OK back then."
- **Appeal to vanity:** Believers in C have some desirable personal attribute [strength, beauty, athletic skill, etc.]. Therefore, C.
    - "People who believe in superiority of Apple products are cool. Therefore, Apple products really are superior."
- **Appeal to snobbery**: Believers in C form a small, elite group. Therefore, C.
    - "People who own Mercedes-Benzes are a small, elite group. Therefore, Mercedes-Benzes are probably the best cars to buy."

The appeal to the people fallacy is important in explaining why many of us share the political, religious, or scientific views of our parents, family members, and peer groups. Any time we uncritically adopt the beliefs of those around us(without seriously considering the evidence), we have committed this fallacy. Again, it's worth remembering that the conclusion of these arguments *might* be true (and some of the beliefs people adopt in this way almost certainly are true!)—it's just that our reason for thinking so is utterly irrelevant. (And so, using

these methods regularly can lead to very bad outcomes, since it can easily lead us to believe false, harmful things as easily as true ones).

[Question: Have you even fallen victim to the "appeal to the people". That is, have you ever found yourself "changing your mind" about something as a result of wanting to "fit in" with a certain group?]

3.3 AD HOMINEN (AGAINST THE PERSON)

The **ad hominem** fallacy (or **argument against the person**) concludes that a certain argument fails because of logically irrelevant features of the person who made the argument.

- **Abusive:** The person arguing in favor of C is a bad person. So, C is false.
    - "Candidate A claims that abortion ought to be immoral because it involves killing innocent humans. But candidate A got an abortion when she was young. So, abortion is perfectly OK."
- **Circumstantial:** The person arguing in favor of C would personally benefit if C were believed. So, C is false.

- "The nurse at Mayo said I should go see a specialist. But of course she would say that—after all, she's an employee of Mayo, and her salary gets paid by people like me seeking treatment. So, I should just ignore her."

- **Tu quoque ("you too"):** The person arguing in favor of C is a hypocrite who does not really believe that C. So, C is false.
  - "My father says that smoking is unhealthy, and is a major cause of lung cancer. But I caught him smoking last night. So, it's obvious that smoking doesn't lung cancer."

In contrast to the ad hominem fallacy, there are many (perfectly good) arguments concerning the character of people. For example: "Jimmy lies constantly. So, I'm not going to believe the next one of his stories" might be a perfectly good argument, as would "Jenny has repeatedly been arrested for drunk driving. So, I don't think she should be employed as a school bus driver, and maybe she ought to go to jail." The ad hominem fallacy only occurs when a person has given you an *argument,* and you decide to ignore the argument for reasons that have to do with the person's *character.*

[Question: Give an example of an "ad hominem" fallacy involving some public figure. Now, give an example of an argument about "character" that does NOT commit this fallacy.]

3.4 More Fallacies of Relevance

Three Ways of Changing the Subject. These three fallacies involve premises that subtly "change the subject" from what is logically relevant. These fallacies more often occur in longer arguments.

Straw man: A misrepresentation of C [or of an argument for C] is false. So, C is false.

- "Proponents of legalizing physician-assisted suicide argue that we should kill off old people to save money. But this is ridiculous. Clearly, we ought to vote against any policy legalizing physician-assisted suicide."

Missing the Point: There is good reason to believe C1. Therefore, C2 [a different/stronger conclusion than C1].

- "There are many good reasons for supposing that a human's life is worth more than a cow's. So, there is nothing immoral about eating a hamburger at McDonald's."

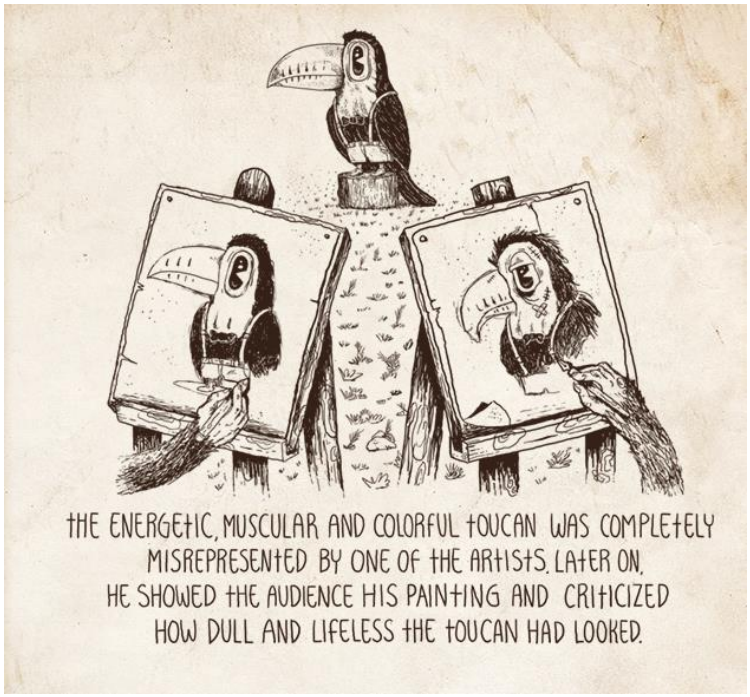


Figure 4 The Strawman Fallacy. From Ali Almossawi's Book of Bad Arguments.

Red Herring: I will show that C1. Here goes. P1 and P2 entail P3. P3 entails P4 and P5. P5 entails C2. [Confused audience accepts C1 as having been successfully argued for.]

- "Pascal has given an argument that it is rational to believe in God, regardless of how weak we might think the evidence is. And I agree that the evidence is weak! [Goes on to talk about arguments for/against God for 20 minutes]. So, Pascal is wrong about the rationality of believing in God."

"Accidental" Problems. The fallacy of **accident** occurs when a premise invokes a rule that is irrelevant because of some "accidental" feature of the situation being considered. The basic form is "It is a rule that P [without A] implies C. P and A. Therefore, C."

- "Since it is illegal to jaywalk, that person committed a crime by running into the street to save the infant from an oncoming car."
- "Since private citizens have a right to bear arms, private citizens have a right to buy nuclear weapons."

The fallacy of accident is sometimes invoked by people who *intentionally* misunderstand a rule or law so that they claim that they broke a rule "by accident," and thus should be not punished too severely. They rely on the fact that others will interpret their words and actions "charitably." (This raises a problem: How can we tell whether someone is doing this?)

[Question: Think of a position/belief you disagree with. Now, give a *fallacious* argument against that position that uses the straw man, red herring, or missing the point fallacy. What's wrong with arguing this way?]

3.5 SOLVED PROBLEMS

Identify which fallacy is committed by the following arguments, if any:

Passage	Analysis
"When Don Corleone first told me that I should cast his godson in my movie, I thought this would be a terrible idea, since I've always thought his godson is a really bad actor. However, then he chopped off my prize horse's head, and left the bloody head in bed with me as a warning. Now, I've changed my mind—the godson is obviously a great actor!"	Appeal to Force—the person changes their mind because of a threat. Note that it is NOT a fallacy to "do what the godfather says" in order to preserve your life. The fallacy occurs only when you begin to *believe* whatever it is that the person threatening you wants you to believe.
"I really like my godson, and I know not getting that movie part really upset him. Without a doubt, he has been mistreated by the casting agency."	Appeal to Pity. It's crucially important to remember that *liking* someone, or *feeling sorry* for them, doesn't necessarily mean their arguments are correct. In order to determine whether the conclusion is true, we would need to actually find out what happened during the audition.
"Members of the mafia are everything I want to be—rich, powerful, respected, and feared. And they clearly think it is occasionally OK to murder people. So, occasionally murdering people really is OK."	Appeal to the People. This argument confuses two very different things—a moral conclusion about whether murdering people is OK with premises about how one wants others to see you.
"My grandma always said that God helps those who helps themselves. And I clearly helped myself by importing large amounts of heroin and selling it. So, grandma (and God) would approve of my doing this."	Accident. This involves the misapplication of a general rule/idea (basically, that one should work hard, or something like that) to a situation that it is quite obviously not applicable to.
"Tom just told me that it's probably not the best idea for me to immediately shoot anyone who annoys me. Obviously, Tom thinks I should just passively accept whatever horrible things people do to me. But this is a recipe for disaster! So, I'm going to keep shooting people."	This looks like a strawman fallacy (and also a bit like a false dilemma, which we'll be studying later). It's almost certain that Tom isn't really saying what the speaker says that he said, and that his real argument is a bit more nuanced.

"Marlon Brando made a number of anti-Semitic comments over his life. So, I think we can dismiss any argument about his performance in the Godfather being 'great.'"	This is a variant of Ad hominem. It's important to note here that one CAN make arguments about people's character, and draw conclusions from it (e.g., "we ought not allow this person to receive big awards, or put them in future movies, etc."). However, the argument needs to spell out the logical connection between the character flaw and the conclusion being drawn.
"What do you mean you think the *Godfather* is too violent for your taste? After all, many of the events that happened it are based on real life, and Italian organized crime is actually still quite powerful. I think you'd find the history of the subject really fascinating…"	Red Herring. None of the claims being offered here actually address what seems to be the actual point of contention (e.g., whether the film is too violent).

3.6 REVIEW QUESTIONS

1. Can you think of any "real-world" examples of the fallacies of relevance discussed in this section?
2. Which fallacy of relevance, if any, do you think that you are most prone to commit? Why do you think this is?
3. Some psychologists and sociologists have argued that fallacies of relevance can help us understand a variety of facts. Which fallacies of relevance might be involved in each of these? Are there any alternative (non-fallacious) explanations for people behaving in these ways? (You might have different answers for different facts.)
    a. Most people have similar religious and political beliefs to their parents and friend groups.
    b. Having a product promoted by a well-known and physically attractive person increases sales.
    c. Political candidates with known personal failings (even where these aren't directly related to their performance in office) are less likely to be elected.

4 READING: WHY DO YOU BELIEVE WHAT YOU DO? RUN SOME DIAGNOSTICS ON IT (BY MIRIAM SCHOENFIELD)[2]

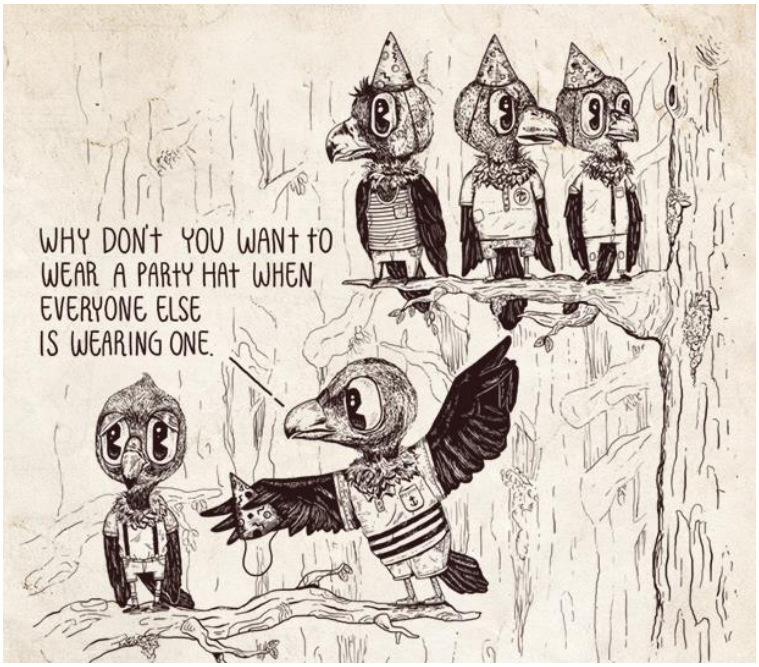


Figure 5 Appeal to the People. From "The Book of Bad Arguments."

Many of the beliefs that play a fundamental role in our worldview are largely the result of the communities in which we've been immersed. Religious parents tend to beget religious children, liberal educational institutions tend to produce liberal graduates, blue states stay mostly blue, and red ones stay mostly red. Of course, some people, through their own sheer intelligence, might be able to see through fallacious reasoning, detect biases and, as a result, resist the social influences that lead most of us to belief. But I'm not that special, and so learning how susceptible my beliefs are to these sorts of influences makes me a bit squirmy.

Let's work with a hypothetical example. Suppose I'm raised among atheists and firmly believe that God doesn't exist. I realise that, had I grown up in a religious community, I would almost certainly have believed in God. Furthermore, we can imagine that, had I grown up a theist, I would have been exposed to all the considerations that I take to be relevant to the question of whether God exists: I would have learned science and history, I would have heard all the same arguments for and against the existence of God. The difference is that I would *interpret* this evidence differently. Divergences in belief result from the fact that people weigh the evidence for and against theism in varying ways. It's not as if pooling resources and having a conversation would result in one side convincing the other – we wouldn't have had centuries of religious conflict if things were so simple. Rather, each side will insist that the balance of considerations supports its position – and this insistence will be a product of the social environments that people on that side were raised in.

[Brendan: Think about your own upbringing, and your current beliefs about religion. How might these be different if you'd been raised differently?]

The you-just-believe-that-because challenge is meant to make us suspicious of our beliefs, to motivate us to reduce our confidence, or even abandon them completely. But what exactly does this challenge amount to? The fact that I have my particular beliefs as a result of growing up in a certain community is just a boring psychological fact about me and is not, in itself, evidence for or against anything so grand as the existence of God. So, you might wonder, if these psychological facts about us are not themselves evidence for or against our worldview, why would learning them motivate any of us to reduce our confidence in such matters?

[2] Miriam Schoenfield, "Why Do You Believe What You Do? Run Some Diagnostics on It," Aeon, 2020, https://aeon.co/ideas/why-do-you-believe-what-you-do-run-some-diagnostics-on-it.

The *method* of believing whatever one's social surroundings tell one to believe is not reliable. So, when I learn about the social influences on my belief, I learn that I've formed my beliefs using an unreliable method. If it turns out that my thermometer produces its readings using an unreliable mechanism, I cease to trust the thermometer. Similarly, learning that my beliefs were produced by an unreliable process means that I should cease to trust them too.

But in the hypothetical example, do I really hold that *my* beliefs were formed by an unreliable mechanism? I might think as follows: 'I formed my atheistic beliefs as a result of growing up in *my* particular community, not as a result of growing up in *some community or another*. The fact that there are a bunch of communities out there that inculcate their members with false beliefs doesn't mean that my community does. So I deny that my beliefs were formed by an unreliable method. Luckily for me, they were formed by an extremely reliable method: they are the result of growing up among intelligent well-informed people with a sensible worldview.'

The thermometer analogy, then, is inapt. Learning that I would have believed differently if I'd been raised by a different community is not like learning that *my* thermometer is unreliable. It's more like learning that my thermometer came from a store that sells a large number of unreliable thermometers. But the fact that the store sells unreliable thermometers doesn't mean I shouldn't trust the readings of my particular thermometer. After all, I might have excellent reasons to think that I got lucky and bought one of the few reliable ones.

[Brendan: Before reading the author's response to this argument, what do YOU think? Is it OK to think "Well, of course other people shouldn't trust the communities they were raised in? However, it's perfectly fine for me to do so."]

There's something fishy about the 'I got lucky' response because I would think *the very same thing* if I were raised in a community that I take to believe falsehoods. If I'm an atheist, I might think: 'Luckily, I was raised by people who are well-educated, take science seriously, and aren't in the grip of old-fashioned religious dogma.' But if I were a theist, I would think something along the lines of: 'If I'd been raised among arrogant people who believe that there is nothing greater than themselves, I might never have personally experienced God's grace, and would have ended up with a completely distorted view of reality.' The fact that the 'I got lucky' response is a response *anyone* could give seems to undermine its legitimacy.

Despite the apparent fishiness of the 'I got lucky' response in the case of religious belief, this response is perfectly sensible in other cases. Return to the thermometers. Suppose that, when I was looking for a thermometer, I knew very little about the different types and picked a random one off the shelf. After learning that the store sells many unreliable thermometers, I get worried and do some serious research. I discover that the particular thermometer I bought is produced by a reputable company whose thermometers are extraordinarily reliable. There's nothing wrong with thinking: 'How lucky I am to have ended up with *this* excellent thermometer!'

What's the difference? Why does it seem perfectly reasonable to think I got lucky about the thermometer I bought but not to think that I got lucky with the community I was raised in? Here's the answer: my belief that the community I was raised in is a reliable one is *itself*, plausibly, a result of growing up in that community. If I don't take for granted the beliefs that my community instilled in me, then I'll find that I have no particular reason to think that my community is more reliable than others. If we're evaluating the reliability of some belief-forming method, we can't use beliefs that are the result of that very method in support of that method's reliability.

[Brendan: In your own words, how would you explain the meaning of "we can't use beliefs that are the result of that very method in support of that method's reliability."]

So, if we ought to abandon our socially influenced beliefs, it is for the following reason: deliberation about whether to maintain or abandon a belief, or set of beliefs, due to the worries about how the beliefs were formed must be conducted from a perspective that doesn't rely on the beliefs in question. Here's another way of putting the point: when we're concerned about some belief we have, and are wondering whether to give it up, we're engaged in doubt. When we doubt, we set aside some belief or cluster of beliefs, and we wonder whether the beliefs in question can be recovered from a perspective that doesn't rely on those beliefs. Sometimes, we learn that they can be recovered once they've been subject to doubt, and other times we learn that they can't.

What's worrisome about the realisation that our moral, religious and political beliefs are heavily socially influenced is that many ways of recovering belief from doubt are not available to us in this case. We can't make use of ordinary arguments in support of these beliefs because, in the perspective of doubt, the legitimacy of those very arguments is being questioned: after all, we are imagining that we find the arguments for our view more compelling than the arguments for alternative views as a result of the very social influences with which we're concerned. In the perspective of doubt, we also can't take the fact that we believe what we do as evidence for the belief's truth, because we know that we believe what we do simply because we were raised in a certain environment, and the fact that we were raised here rather than there is no good reason to think that our beliefs are the correct ones.

It's important to realise that the concern about beliefs being socially influenced is worrisome *only* if we're deliberating about whether to maintain belief from the perspective of doubt. For recall that the facts about how my particular beliefs were caused are not, in themselves, evidence for or against any particular religious, moral or political outlook. So if you were thinking about whether to abandon your beliefs from a perspective in which you're willing to make use of all of the reasoning and arguments that you normally use, you would simply think that you got lucky – just as you might have got lucky buying a particular thermometer, or reaching the train moments before it shuts its doors, or striking up a conversation on an airplane with someone who ends up being the love of your life.

There's no general problem with thinking that we've been lucky – sometimes we are. The worry is just that, from the perspective of doubt, we don't have the resources to justify the claim that we've been lucky. What's needed to support such a belief is part of what's being questioned.

[Brendan: Why might it be valuable to (sometimes) adopt the "perspective of doubt" toward our own beliefs and practices? Have you even done this? How did it go?]

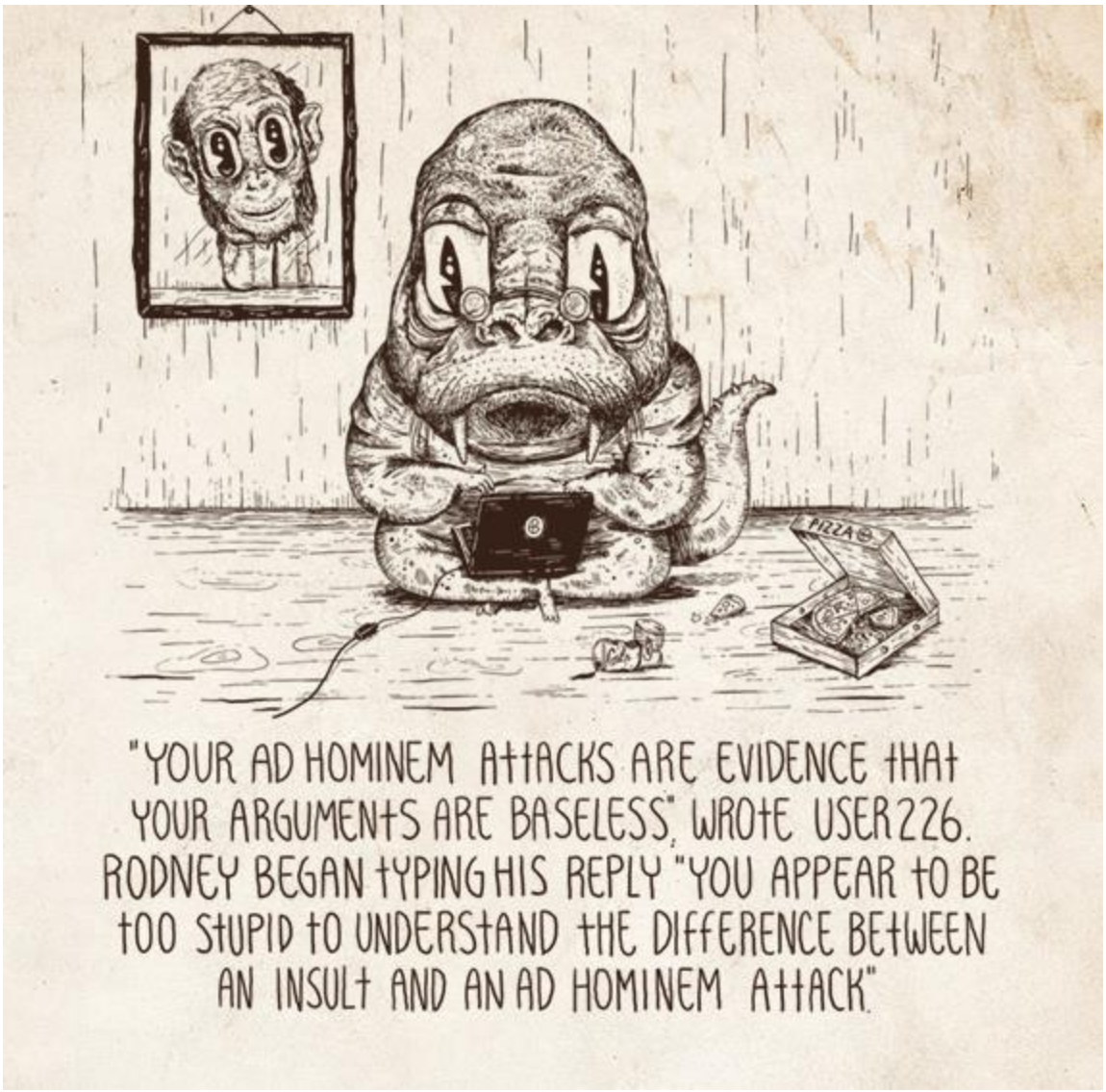


Figure 6 Ad Hominem. From "The Book of Bad Arguments."

5 READING: A GOOD SCRAP (IAN LESLIE)

Disagreements can be unpleasant, even offensive, but they are vital to human reason. Without them we remain in the dark.

In the town of Dayton, Ohio, at the end of the 19th century, locals were used to the sound of quarrels spilling out from the room above the bicycle store on West Third Street. The brothers Wilbur and Orville Wright opened the shop in 1892, shortly before they became obsessed with the problem of manned flight. Downstairs, they fixed and sold bicycles. Upstairs, they argued about flying machines.

Charles Taylor, who worked on the shop floor of the Wright Cycle Company, described the room above as 'frightened with argument'. He recalled: 'The boys were working out a lot of theory in those days, and occasionally they would get into terrific arguments. They'd shout at each other something terrible. I don't think they really got mad, but they sure got awfully hot.'

We're so familiar with the fact that the Wright brothers invented the aeroplane that the miraculous nature of their achievement goes unheralded. Wilbur and Orville were not scientists or qualified engineers. They didn't attend university and they weren't attached to any corporation. In fact, before their breakthrough, they'd accomplished little of note. So, just how did they come to solve one of the greatest engineering puzzles in history? Their success owes a lot to their talent for productive argument.

The brothers, four years apart, were close. 'From the time we were little children,' wrote Wilbur, 'my brother Orville and myself lived together, worked together, and in fact, thought together.' But that should not be taken to mean they had the same thoughts; the way they thought together was through argument. It was their father, Milton Wright, who taught them how to argue productively. After the evening meal, Milton would introduce a topic and instruct the boys to debate it as vigorously as possible without being disrespectful. Then he would tell them to change sides and start again. It proved great training. In *The Bishop's Boys* (1989), his biography of the brothers, Tom Crouch writes: 'In time, they would learn to argue in a more effective way, tossing ideas back and forth in a kind of verbal shorthand until a kernel of truth began to emerge.' After a family friend expressed his discomfort at the way the brothers argued, Wilbur, the elder, explained why arguing was so important to them:

> *No truth is without some mixture of error, and no error so false but that it possesses no element of truth. If a man is in too big a hurry to give up an error, he is liable to give up some truth with it, and in accepting the arguments of the other man he is sure to get some errors with it. Honest argument is merely a process of mutually picking the beams and motes out of each other's eyes so both can see clearly…*

Wilbur Wright's description of collaborative intellectual enquiry is one the ancient Greeks would have recognised. Socrates believed that the best way to dispel illusions and identify fallacies was through the exchange of arguments. His took place in the town square of Athens, often with the city's most respected intellectuals. His favoured technique was to invite someone to say what they believed (about the nature of justice, say, or happiness) before asking them why and how they could be so sure. Eventually, under persistent questioning, the fragility of the intellectual's initial confidence would be revealed.

[Brendan: Is there anybody in your life that you can have "productive arguments" with?]

Agnes Callard, associate professor of philosophy at the University of Chicago and an expert on the ancient Greeks, says that Socrates was responsible for one of the founding innovations of Western thought: what she calls the 'adversarial division of epistemic labour', in which one party's job is to throw up hypotheses, while the other's is to knock them down. This is exactly what happens in a modern courtroom as prosecutor and defender cooperate in a quest for justice by ripping each other's arguments apart. Even though Socrates himself was sceptical of democracy as a form of government, the idea that people with different views can vigorously yet cooperatively disagree is essential to democratic society.

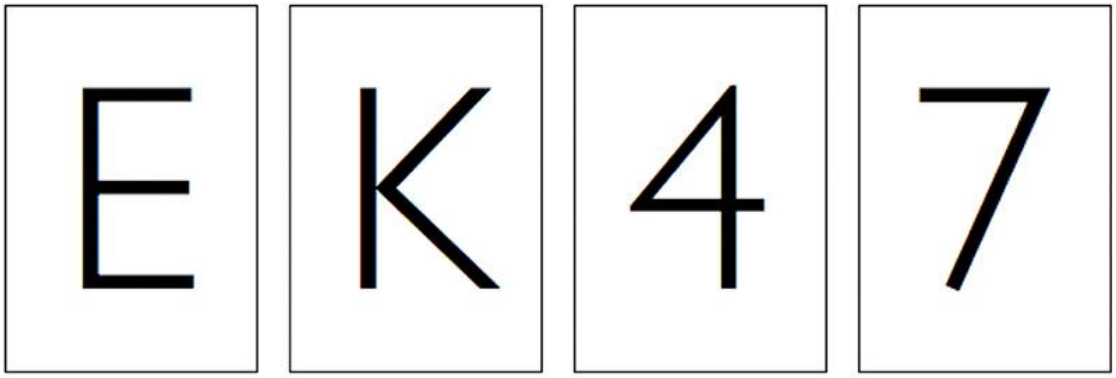
Today, I believe we're in danger of losing touch with this principle. Open disagreement is associated with personal animus, stress and futility, partly because we see so many toxic fights on social media. Thanks to the popularisation of research into the flaws of human cognition, we've also become increasingly aware of how hard it is to argue without 'biases', such as the tendency to pick a side and stick to it rather than weighing evidence for different views dispassionately. It can be tempting, then, to avoid open argument altogether, but this merely transforms our differences into sullen resentment, while depriving us of a powerful tool of enquiry. An alternative is to propose that, when debates do take place, they should be fastidiously civil, emotionally detached and unimpeachably rational.

[Brendan: Do you think it is tougher or easier to argue productively on social media or "in real life"? Why?]

But the Wright brothers didn't argue politely or dutifully. They took delight in verbal combat, throwing themselves into every battle. 'Orv's a good scrapper,' said Wilbur, fondly. In another letter, Wilbur chastised a friend for being *too* reasonable: 'I see you are back to your old trick of giving up before you are half-beaten in an argument,' he wrote. 'I felt pretty certain of my own ground but was anticipating the pleasure of a good scrap before the matter was settled.'

The Wrights were on to something. We shouldn't avoid robust, passionate, biased argument. In fact, under the right conditions, it can be the fastest route to truth. A good scrap can turn our cognitive flaws into collective virtues.

In 1966, the English psychologist Peter Wason introduced a simple experimental design that has since gone on to have an enduring impact on the study of human reasoning. The Wason Selection Task works like this. Imagine these are four cards, flat on the table, each has a number on one side and a letter on the other side:



Your task is to prove the following rule true or false: 'All cards with a vowel on one side have an even number on the other side.' Which card or cards do you need to turn over to test this rule?

Take a minute to think about it.

In Wason's experiment and in numerous replications since, about 80 per cent of people pick two cards: E and 4. That's the wrong answer. Turning over 4 doesn't actually tell you anything; the rule doesn't state that consonants can't be paired with even numbers. The correct answer is to turn over E and 7, since those are the only two cards that can prove the rule *false*. If there is an odd number on the other side of E, or a vowel on the other side of 7, then the case is closed.

It might seem like a trivial mistake but, ever since Wason published his results, the fact that most people flunk this task has been taken as powerful evidence that human reasoning has a fundamental flaw: we're strongly inclined to search for evidence that confirms our beliefs (or in this case, that confirms the supposed rule), rather than to look for ways to disconfirm them. This flaw has since gained a catchy name – confirmation bias – and become one of the most well-evidenced findings in psychology.

It's been replicated in countless ways. In a landmark 1979 study, psychologists recruited students who had firm views for or against the death penalty, and then presented them with two reports of equally rigorous fictitious studies that seemed either to support or undermine the hypothesis that capital punishment deters crime. Next, the researchers asked the students to assess the robustness of the two studies. As you might have

guessed, the students showed favouritism toward the methodology of whichever paper supported their own initial view.

[Brendan: I can almost *guarantee* you that you've at some point been the victim of "confirmation bias" (I know I have!). Can you give examples?]

Humans have an instinctive aversion to the possibility of being wrong. Armed with a hypothesis, we bend reality around it, clinging to our opinions even in the face of evidence to the contrary. If I believe that the world is going to hell in a handcart, I'll notice only bad news and screen out the good. Once I've decided that the Moon landings were a hoax, I'll watch YouTube videos that agree with me and reason away any counter-evidence that might cross my path. Intelligence is no protection from confirmation bias, nor is knowledge. In fact, clever and knowledgeable individuals have been shown to be *more* prone to it, since they're better at finding reasons to support what they already believe, and more confident in their own mistaken views.

[Brendan: This is one of my favorite research findings—unless you are careful, being smart does NOT protect you from having false beliefs, since you just use your "smartness" to come up with reasons in support of your bad beliefs!]

Confirmation bias would seem to be a big problem for our species because it makes us more likely to deceive ourselves about the nature of the world. It also makes us more likely to fall for the lies of those who tell us things we are already predisposed to believe. 'If one were to attempt to identify a single problematic aspect of human reasoning that deserves attention above all others, the *confirmation bias* would have to be among the candidates for consideration,' wrote Raymond Nickerson, a psychologist at Tufts University, in 1998.

This raises a tough question. The ability to reason is meant to be humanity's supreme attribute, the characteristic that most sets us apart from other animals. Why, then, has evolution endowed us with a tool so faulty that, if you bought it from a shop, you'd send it back? The French evolutionary psychologists Hugo Mercier and Dan Sperber have offered an intriguing answer to this question. If our reasoning capacity is so bad at helping us as individuals figure out the truth, they say, that's because truth-seeking isn't its function. Instead, human reason evolved because it helps us to argue more effectively.

Homo sapiens is an intensely collaborative species. Smaller and less powerful than other primates – weedy, compared with our Neanderthal forebears – our human ancestors nevertheless managed to dominate almost any environment they set foot in, mainly because they were so good at banding together to meet their needs. Given the importance of cooperation to our survival, we've evolved a finely tuned set of abilities for dealing with each other. In Mercier and Sperber's view, reasoning is one of those social skills.

In the debate over the nature of human intelligence, Mercier and Sperber are 'interactionists', as opposed to 'intellectualists'. For intellectualists, the purpose of our reasoning capacity is to enable individuals to gain knowledge of the world. In the interactionist view, by contrast, reason didn't evolve to help individuals reach truths, but to facilitate group communication and cooperation. Reasoning makes us smarter only when we practise it with other people in argument. Socrates was on to something.

[Brendan: What do you think of these two views of intelligence (interaction vs intellectual)? Which fits better with your own experience?]

In most studies, the Wason Selection Task is completed by individuals working alone. What happens when you ask a group to solve it? That's what David Moshman and Molly Geil, of the University of Nebraska-Lincoln, wanted to find out. They assigned the task to psychology students, either as individuals, or in groups of half a dozen. As a third condition, some individuals were given the test alone, and then joined a group. The results were dramatic: the success rate of groups was 75 per cent, compared with 9 per cent for individuals.

Ever since Wason himself ran the experiment, it has been repeated many times with many different volunteers, including students from elite universities in the US, and with participants offered a cash bonus for getting the right answer. Yet the results have always been pitiful; rarely did more than 20 per cent of people pick the correct cards. Moshman and Geil vastly improved people's performance at the task simply by getting them to talk it through. It's as if a group of high-jumpers discovered that by jumping together they could clear a house.

This is a surprise only if you take the intellectualist perspective. If reasoning is a fundamentally social skill, it's precisely what we should expect. Moshman and Geil's analysis of the group discussions further supports the interactionist view. One member of the group would be the first to work out the correct answer, and then the rest of the group would fall into line, but only after a debate. It's not that one person got to the right answer and everyone immediately agreed. Truth won out only after an exchange of arguments.

While humans have accumulated a vast store of collective knowledge, each of us alone knows surprisingly little, and often less than we imagine (for instance, we tend to overestimate our understanding of even mundane items, such as zips, toilets and bicycles). Yet each of us is plugged into a vast intelligence network, which includes the dead as well as the living; the more open and fluid your local network, the smarter you can be. Moreover, open disagreement is one of the main ways we have of raiding other people's expertise while donating our own to the common pool.

Sperber and Mercier argue that, looked at through the interactionist lens, confirmation bias is actually a feature, not a bug of human cognition. It maximises the contribution that each individual makes to a group, by motivating them to generate new information and new arguments. Think about what it's like when someone contradicts you. You feel motivated to think of all the reasons you're right and the other person is wrong, especially if it's an issue you care about. You might be doing so for selfish or emotional reasons – to justify yourself or prove how smart you are. Even so, you're helping the group generate a diversity of viewpoints and then select the strongest arguments. When you bring your opinions to the table and I bring mine, and we both feel compelled to make the best case we can, the answers that emerge will be stronger for having been forged in the crucible of our disagreement.

Perhaps, rather than trying to cure the human tendency to make self-centred arguments, we should harness it. This is a principle understood by the world's greatest investor, Warren Buffett. When a company is considering a takeover bid, it often hires an investment banking firm to advise on the acquisition. But this raises a conflict of interest: the bankers have a strong incentive to persuade the board to do the deal. After all: no deal, no fee. In 2009, Buffett proposed that companies adopt a counterbalancing measure:

It appears to me that there is only one way to get a rational and balanced discussion. Directors should hire a second advisor to make the case *against* the proposed acquisition, with its fee contingent on the deal *not* going through.

The genius of this approach lies in the fee. Buffett doesn't just advise getting a second opinion; he advises giving the second advisor a financial incentive to win the argument. Why? Because by doing so, the directors can harness the power of biased thinking, even as they guard against their own. The second advisor is now strongly motivated to think of as many good reasons as it can that the deal should not go through. The board will then have generated a set of arguments for and a set of arguments against, and be in a stronger position to make the right call.

Incentives don't have to be financial, of course. Tribalism – the desire to see our group win – is usually portrayed, for good reason, as the enemy of reasoned thought. But it can also be an aid to it. In 2019, a team of scientists led by James Evans, a sociologist at the University of Chicago, published their study of a vast database of disagreements: the edits made to Wikipedia pages. Behind every topic, there is a 'talk page' that

anyone can open up to observe editors debating their proposed additions and deletions. The researchers used machine learning to identify the political leanings of hundreds of thousands of editors – whether they were 'red' or 'blue' – based on their edits of political pages. Here's what they discovered: the more polarised the editorial team, the better the quality of the page they were working on.

[Brendan: We often here that "polarization" is bad. However, it seems as if the "environment" is structured correctly, it can actually be helpful. When you think of "well-functioning" group (for example, with your coworkers), would you rather have people who are similar, or those who are dissimilar? Why?]

Ideologically polarised teams were more competitive – they had more arguments than more homogeneous or 'moderate' teams. But their arguments improved the quality of the resulting page. Editors working on one page told the researchers: 'We have to admit that the position that was echoed at the end of the argument was much stronger and balanced.' That 'have to' is important: the begrudging way that each side came to an agreement made the answer they arrived at stronger than it otherwise would have been. As Evans's team put it: 'If they too-easily updated their opinion, then they wouldn't have been motivated to find counter-factual and counter-data arguments that fuel that conversation.'

Pursuing a strongly held conviction, *even when it's wrong*, can still be productive at the group level. It's an elegant paradox: in order for a group to reach rational conclusions, at least some of its individual members should argue a little irrationally. When everyone feels compelled to generate arguments and knock down competing arguments, the weakest arguments get dismissed while the strongest arguments survive, bolstered with more evidence and better reasons. The result is a deeper and more rigorous process of reasoning than any one person could have carried out alone. Emotion doesn't hinder this process; it electrifies it. By allowing their arguments to run hot, the Wrights were able to beat all the experts in the world.

Open and wholehearted argument can raise the collective intelligence of a group, but the chemistry of a disagreement is inherently unstable. There's always a possibility it might explode into hostile conflict or vaporise into thin air. Self-assertion can turn into aggression, conviction can become stubbornness, the desire to co-operate can become the urge to herd. I've sat around tables at work where most people don't express a strong point of view and simply accept whatever the most confident person in the room says, or just nod along with the first opinion offered because it seems like the nice thing to do. The result is a lifeless discussion in which the dominant view isn't tested or developed.

I've also sat at tables when different individuals fight their corner, sometimes beyond the point that seems reasonable to do so. That kind of debate can be enormously productive; it can also, of course, tip over into an ego battle that generates more heat than light. Over centuries, we've developed processes and institutions to stabilise the volatility of disagreement while unlocking its benefits, modern science being the foremost example. It's also possible to create these conducive conditions ourselves, as the Wikipedians and the Wrights show us.

[Brendan: Who would you rather have as a friend (or romantic partner, or office worker)—a person who agreed with you, even when you were wrong, or someone who argued with (sometimes even when you were right!)?]

The first condition, of course, is to openly disagree. The members of the group must bring their own opinions and insights to the table, rather than just adopting those of whomever they like the most or nodding along with the dominant voices in the room. The more diverse the pool of reasons and information, the greater the chance of truly powerful arguments emerging. It's pointless having a group of smart people around a table if all they do is nod along with each other.

A second condition is that the debate should be allowed to become passionate without becoming a shouting match. How did the Wrights get hot without getting mad? Ivonette Wright Miller, a niece of the brothers, identified a vital ingredient, when she noted that the brothers were adept at 'arguing and *listening*'. The tougher that Wilbur and Orville fought, the more intently they listened. Good listening can be a function of close and respectful personal relationships, as in the case of the Wrights, or from tightly structured discussions that force everyone to attend to other viewpoints, as in the case of the Wikipedians.

Third, the members of the group must share a common goal – whether that be solving a puzzle, making a great Wikipedia page, or figuring out how to get a plane in the air and keep it there. If each member is *only* defending their own position, or trying to get one up on everyone else, then weaker arguments won't get eliminated and the group won't make progress. Each one of us should bring our whole, passionate, biased self to the table, while remembering that our ultimate responsibility is to the group. What matters, in the end, is not that I am right but that we are.

[Brendan: How good are you at having "productive arguments"? What could you to improve on this skill?]